The Refrigeration Service Engineer

VOL. 15 NO. 4 ★ DETROIT ★ APRIL · 1947

Ammonia Compressor Service •
Distribution Through Service •
Moisture and Drying Methods •

THE REFRIGERATION SERVICE ENGINEER, Nickerson & Collins Co., Publishers, 435 N. Waller Ave., Chicago 44, Ill. Published monthly, Vol. 15, No. 4, April, 1947. Entered as second class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Subscription in the United States, $2.00 per year; all other countries, $3.00 per year.

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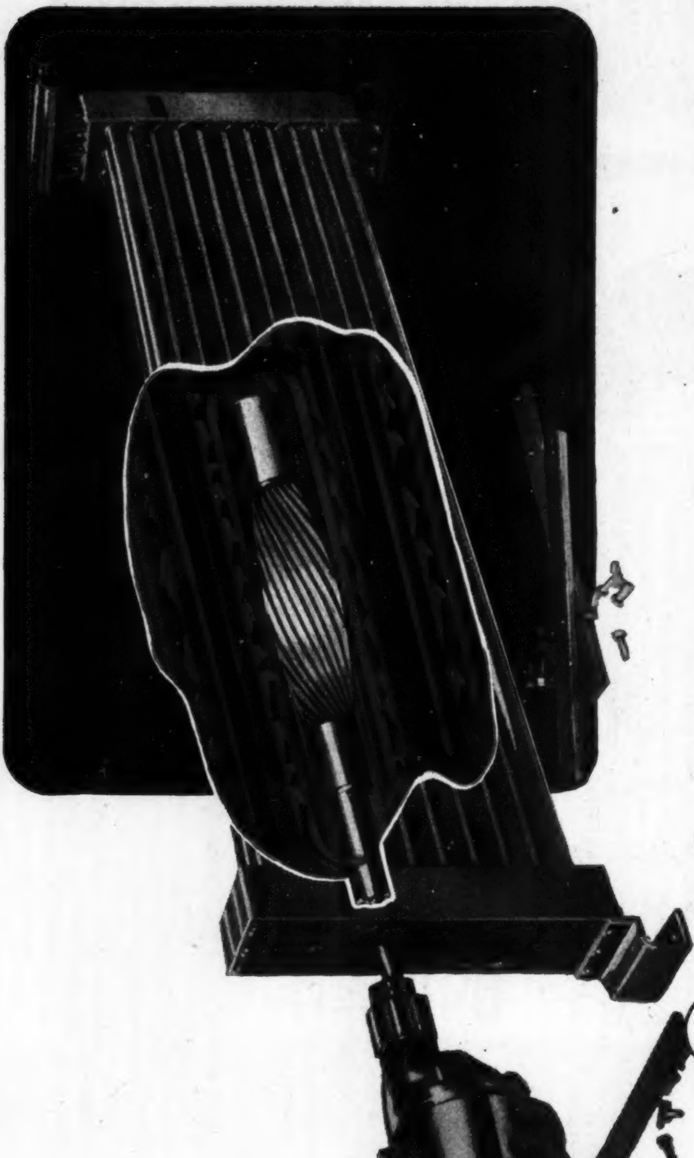
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MUELLER BRASS CO. LIQUID INDICATORS WILL NOT LEAK

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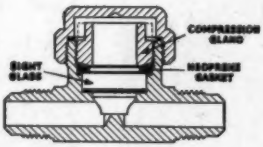

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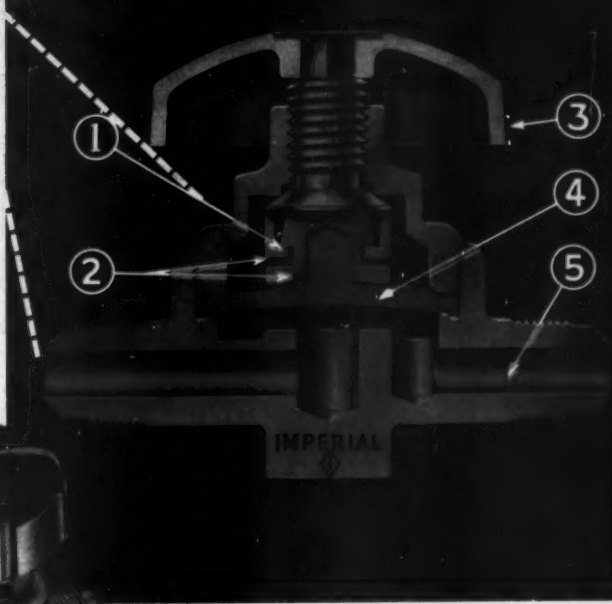

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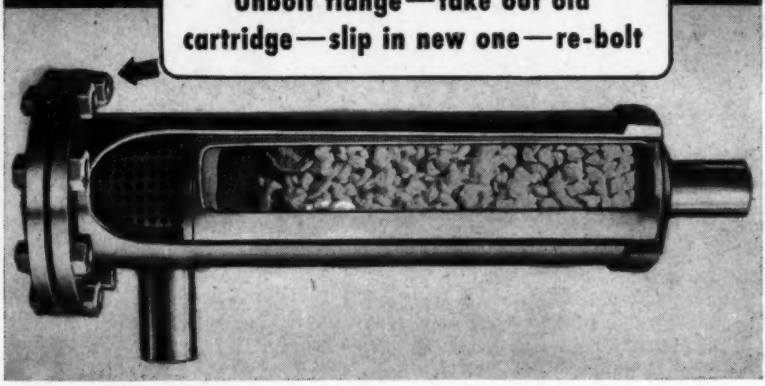

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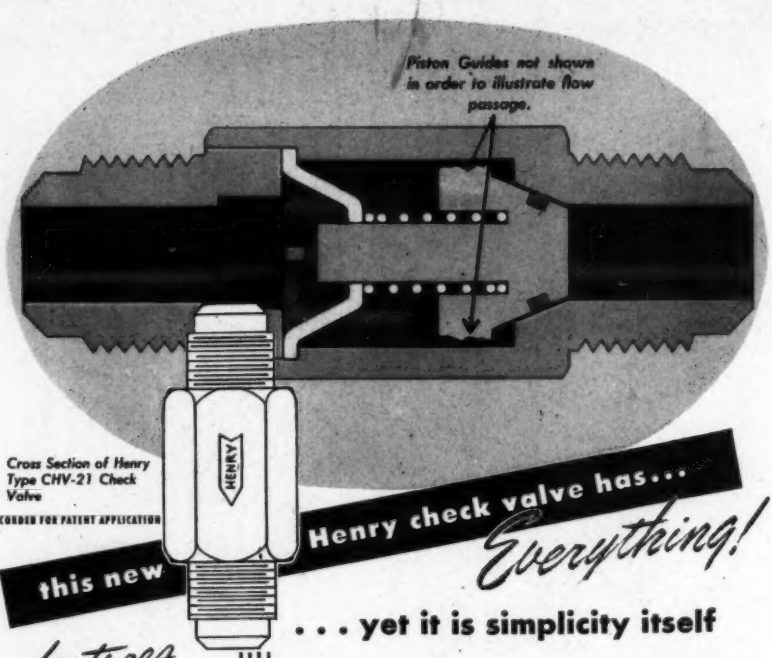

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features of Type CHV-21 Check Valve

1. Compact—minimum number of parts.
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3. Straight through flow, due to seat and piston design—ample passages in spider guide.
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6. Noiseless operation.
7. Brass body—stainless steel spring and spider guide.

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CARTRIDGE NUMBER	CAPACITY IN B.T.U. PER HOUR		
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2	1500	3400	3420
3	3000	6800	6840
4	6000	13600	13700
5	9000	20400	20500
V-200 VALVE WITH NO CARTRIDGE	12000	27204	27400

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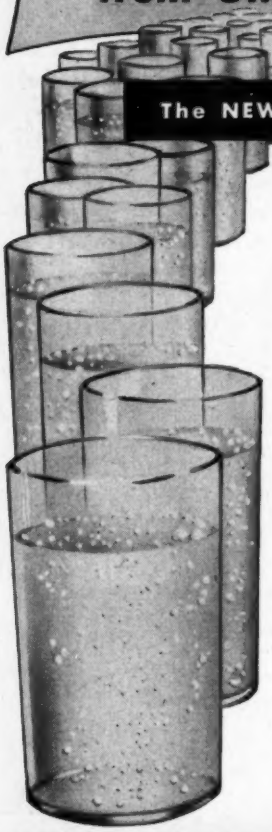

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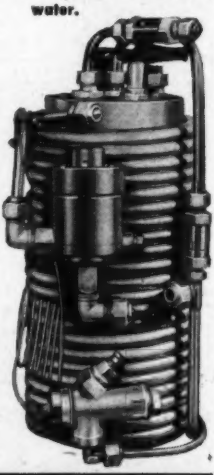

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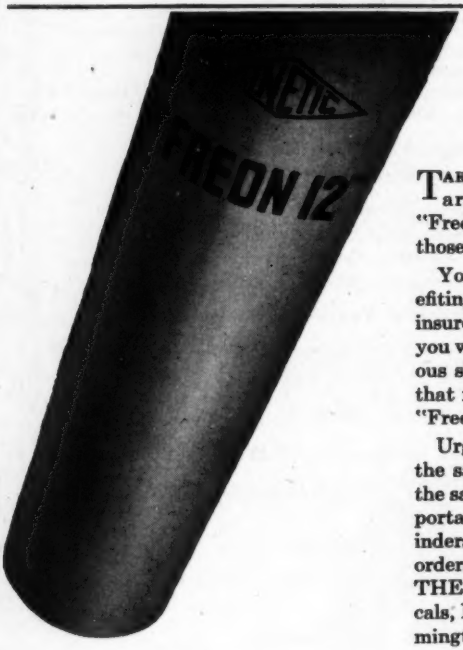
Contents

RETURN EMPTIES *NOW*



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A LARGE percentage of the men in the service field avoid work on ammonia machines either because they are afraid of them, unfamiliar with them, or because they do not have the tools suitable to the work. Yet servicing ammonia machines is lucrative work and no more dangerous or difficult than any other commercial service work. As the author, W. G. McBride, of the article "Construction and Service of Ammonia Compressors" appearing on page 31, points out ". . . ammonia compressors should be considered in the same light as compressors designed for other refrigerants. . . . there may be some slight changes of design or features . . . However, service problems remain the same."

OUR last depression was blamed largely on over-production of durable goods. Yet the war and the years following it thus far have shown us that the same production capacity which was considered too great before the war is not nearly sufficient to supply the demands of our people when they have the ability to buy the things they need. The lesson we learn from this experience is that we must give more attention to distribution problems if we are to maintain a high level of production. In his article appearing on page 37, "Distribution of Refrigeration Can Be Solved Through Service," H. T. McDermott suggests the 30,000 or more independent servicemen as a ready built sales organization for the distribution of refrigeration equipment.

DR. WALTER O. WALKER, author of the article "Moisture and Drying Methods" appearing on page 41, has perhaps done more research on this problem than any other individual, and even though a number of articles and papers have been published on the subject, it is always of interest to the service field. In this article Dr. Walker covers the entire subject from sources of moisture to the methods of removal, using references to most previous papers prepared on the subject.

ALL the service pointers contained on page 47 are on the subject of hermetic units —a field on which little information has thus far been published. There is need for many more pointers on this work.

IF YOU were called upon to change a large commercial condensing unit from a diesel drive to electric motor drive, what size and type of motor would you use? That is one of the questions of the Question and Answer department contained on page 49 of this issue.

DONALD F. DALY'S article "Take the Guess Out of Estimating" appearing on page 51, is the beginning of a very interesting, easy-to-read series on the problems of estimating various types of refrigeration work. The problem of estimating is a very difficult one to deal with in an article, because there are no definite rules to go by and no established formulae on which to base calculations, but Mr. Daly takes the reader behind the scenes, as it were, with the contractor and endeavors to give the reader the benefit of many years experience which, after all, is the major requisite of good estimating.

COVER

OUR front cover this month shows Carrier's new direct drive, 5F40, four cylinder compressors moving along the assembly line. At first glance one might think these are small machines of about two or three horsepower. They are small machines but they are 10 hp. and one of the latest examples of the extent modern engineering has succeeded in reducing the size and weight of refrigerating equipment. Just compare these units with those of 50 or even 25 years ago to fully appreciate the reduction in size.

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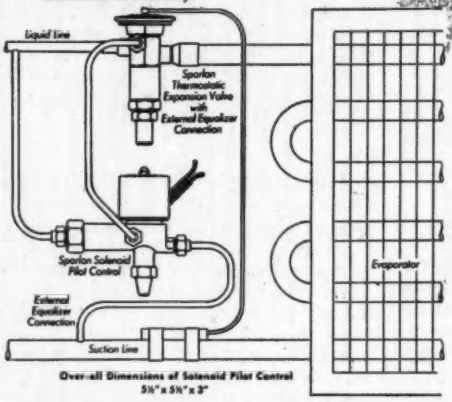

Over-all Dimensions of Solenoid Pilot Control 5⅛" x 5⅛" x 3"

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Two wire control is used...

The expansion valves will be open when the pilot coil is energized and closed when de-energized in exactly the same manner as the conventional solenoid valve. When de-energized the leak from high to low side also stops. The pilot control may be applied to existing jobs merely by connecting with ¼" copper tubing and completing electrical connections.

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Construction and Service of Ammonia Compressors

By W. G. McBRIDE

WE OFTEN hear service men express a preference for one type of system over another, but when we stop to analyze the reason for the selection—the answer is usually that a man prefers the type of work on which he has some knowledge—work that he is familiar with. To me this seems to be one of the reasons why there has been so much misconception among refrigeration service men regarding the servicing of ammonia systems. It seems that a great many service men started out in the domestic field where such refrigerants as SO_2—"Freon-12"—methyl chloride, etc., are used and, therefore, have never had the opportunity to work on ammonia systems.

To old timers in the ammonia field, ammonia is far safer to work on than many other refrigerants such as CO_2, Iso-butane, or propane, so the purpose of this article is to endeavor to clear up some of the misunderstandings service men may have in regards to the use of ammonia, and the servicing of ammonia compressors.

First of all, ammonia—anhydrous ammonia—NH_3—operates at pressures not very much above those prevalent in refrigeration systems using "Freon," methyl chloride, etc. About the closest is "Freon-22." For ammonia, the usual discharge pressure is somewhere between 150 to 200 lbs. There are, of course, some exceptions where the pressure may run somewhat lower due to cold water or above this point where the amount of water is insufficient for condensing purposes; however, on a whole these pressures are average.

Suction pressures may range from below 0 lbs. up to approximately 50 lbs. depending on the desired temperatures to be maintained. A glance at your refrigerant table will show that 0 lbs. ammonia pressure is equal to –28 F. and a 50 lb. suction pressure is equal to a temperature of 34 F.

Pressures in these ranges, of course, are not excessive and, therefore, should not cause any alarm. Then the question is why do service men hesitate about servicing ammonia jobs? The only answer that we can see is that they fear ammonia fumes—plus a lack of experience on this type of equipment.

Servicing ammonia compressors is no more difficult than servicing low pressure refrigerant compressors, once you become familiar with their construction. In this article the author describes the construction and servicing of York compressors, pointing out the few differences between dealing with ammonia and other refrigerants.

Let me say right here, from one who has serviced ammonia equipment for some time, that there is very little danger to the service man working on ammonia systems if he goes about his work in an orderly manner—if he thinks about what he is doing all the time. The most serious accidents with this type of a refrigerant usually can be traced to someone thoughtlessly closing the wrong valve—that is, such valves as the discharge valve, while the compressor is operating, or breaking a line or opening up the system before it is completely pumped down, etc.

Generally speaking, in my opinion, an ammonia job is safe to work on. In the first place, before the service man starts to work he can determine whether there is a leak or not because the slightest trace of ammonia is evident. This slight trace while very pungent is not dangerous and is a direct warning that he should obtain a gas mask. Compare this to refrigerants where there is no warning odor such as CO_2. And certainly ammonia is not as explosive (its explosive limits are very narrow) and can-

* Engineer, York Corp., York, Pa. Paper presented to Annual International R.S.E.S. Convention in Cleveland, Ohio.

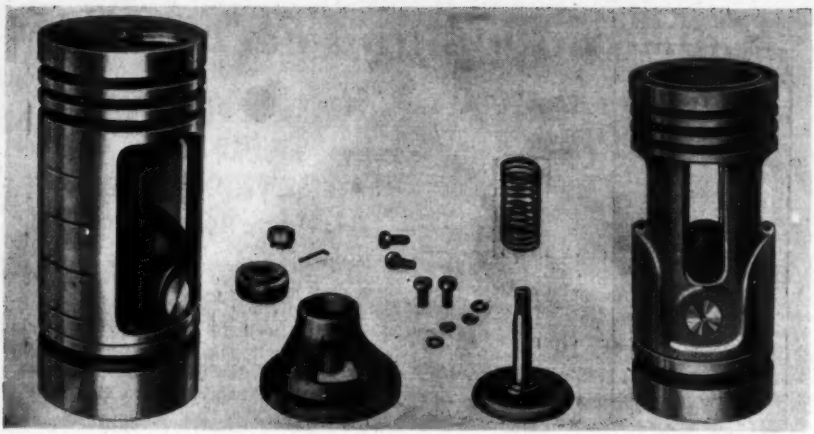

Fig. 1—The pistons and suction valves of an ammonia compressor.

not be compared to that for such refrigerants as Iso-butane, etc.

Just one word about ammonia masks. Don't put too much confidence in these without first determining whether the masks are satisfactory. We mean, don't put a mask on and rush into a room filled with ammonia fumes. Try the mask out first where it is possible for you to get into the fresh air quickly if the mask proves to be defective.

Physically there is very little difference between the compressors for the various refrigerants. They are pumps with pistons, connecting rods, crankshafts, suction and discharge valves. However, on "Freon-12," methyl chloride, etc. we use a shaft seal to prevent the loss of refrigerant, while on the ammonia compressor we generally use compressed fiber packing with a gland to keep the packing tight.

We will now break down the component parts of an ammonia compressor and see just what is required in the line of service work.

Pistons

The pistons Fig. 1, used in the compressors are extra long and are usually of the "double trunk" type. The advantage of this design is that we get better alignment which might otherwise only be obtained with a separate crosshead. The space between the upper and lower trunk permits the entrance of the refrigerant suction gas.

The piston rings may be of several types: plain, bevelled, ventilated, etc. The plain rings are used in the upper trunk to form a seal against the passage of high pressure gas around the piston, while the bevelled, ventilated, etc. type, or oil rings, are used on the lower trunk to permit drainage of excess oil back to the crankcase.

Connecting Rods

The babbitted bearing surface of the connecting rods are in two sections and are die cast. (See Fig. 2). The purpose of babbitted metal being to reduce friction and permit ready replacement of the bearing surface. Wear upon the crankshaft is also reduced to a minimum and the connecting rod itself suffers little or no wear. Take up adjustment of these bearings to the required tightness is usually provided by the use of shims. Replacement connecting rod bearings must be carefully fitted to the crankpin to obtain maximum bearing area.

Main and Out Board Bearings

The main and out board bearings are usually removable die cast babbitt. The bearings are provided with adequate oil ways for proper lubrication of all bearing surfaces.

Following is the procedure for replacing die cast and bearings: pump a vacuum on a crankcase by closing the suction stop valve on the compressor, shut down compressor and immediately close discharge stop valve as soon as the flywheel comes to rest. The crankcase is now ready to be opened. Re-

move bearing head and replace main bearing. (See Fig. 3.) The lugs on the new bearings may have to be filed slightly in order to fit the lug holes in the end bearings. The bearing should also be fit to the shaft to be sure that a good bearing surface is obtained. The bearing surface and the shaft should be coated with clean oil before being mated.

In order to replace the main shaft die cast bearings the following procedure must be followed: Remove flywheel hub shield, and the tapered flywheel key with key puller, remove the flywheel, the out board bearing cap, and the shaft packing. In replacing the main shaft bearing we must move the crankshaft away from the flywheel in order to remove the old bearings. This means we must remove the top heads and discharge valves. Mark each discharge valve when removing. Turn crank to bottom position and remove bottom half of connecting rod bearing, being careful not to disturb the shims. It is also a good plan to mark the rod so that it will be reassembled correctly. By means of eye bolts screwed into the top of the pistons, remove the piston and rod, again marking the piston. Repeat this operation for the other piston. We are now ready to slide the crankshaft away from the flywheel and support the end of the crankshaft. This will facilitate removal of all the bearings. This bearing is usually furnished in two halves; each half has a lug to hold it in position. These lugs may require some filing to fit the lugs in the housing.

After the bearings are fit to the shaft and placed in the housing, the shaft is moved back to its original position. Before doing so coat the shaft and bearing surface with clean oil. The end bearing head is next bolted to the housing and the clearance is checked. This clearance between the shaft and the main bearing should be between .015" and .030". To increase or decrease this clearance, we must use gaskets of different thicknesses under the end bearing head.

We are now ready to hang the pistons and rods being careful to return them to the same cylinder and in the same position from which they were removed. When hanging the pistons the crank should be in the top position. A funnel ring should be used to guide the piston rings into the cylinder. While this job can be done without a funnel ring it will require considerable more time and may also result in broken piston rings. Care must be taken to see that the gap in

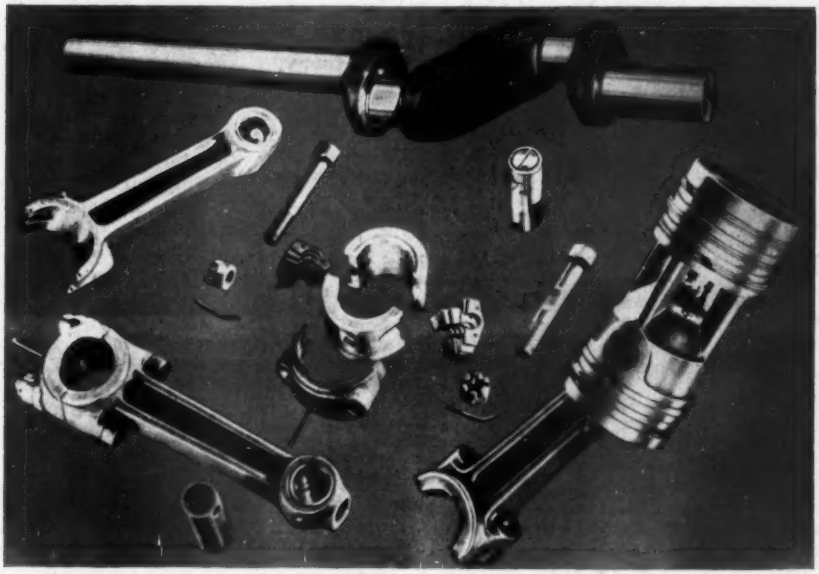

Fig. 2—The connecting rods, connecting rod bearings, piston pin and crankshaft.

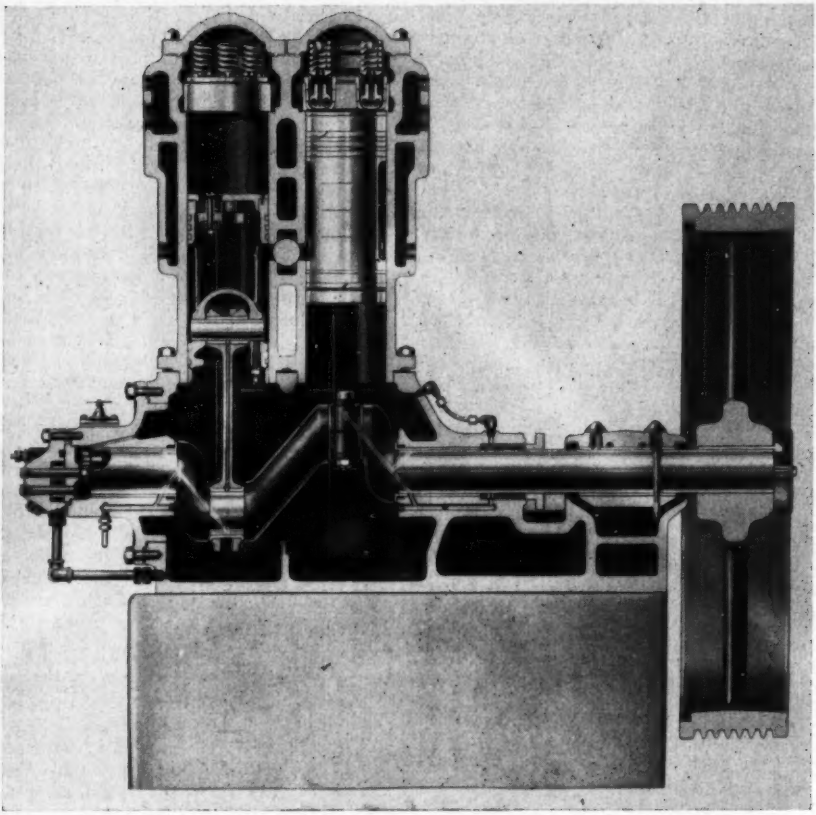

Fig. 3—Cut-away view of the York ammonia compressor.

the piston rings clears the suction port opening or this may also cause damage. Next replace the discharge valves and top heads. Replace outboard bearing and cap and draw down nuts. Replace flywheel, flywheel key and hub shield and belts. Repack the crankshaft, pump out compressor and place into service.

Replacing the Out Board Bearings

These bearings are die cast and are made in two or four sections so that it is not necessary to dismantle the compressor to replace the bearings. Remove the out board bearing cap. The bottom half of the bearing has a side lug to hold it in position. Relieve the weight of the shaft and with a thin strip of wood hammer the bottom half bearing on the side opposite the lug. This will move the bearing around the shaft to a position where it can easily be removed. The top half of this bearing has a lug on the back which fits a drilled hole in the top bearing cap and can be readily removed. Fit the bearing sections to the shaft, coat shaft and bearings with clean oil and slip bearings into place. Relieve shaft support and replace bearing cap.

Lubrication and Oil Pumping

All bearings except the out board bearing may be lubricated by splash or force feed lubrication. The smaller commercial size compressors, 8" or 4" base, are usually of the splash type. Ammonia compressors are equipped with sight glass to indicate the oil

level in the crankcase, regardless of the type of lubrication used. In most cases the manufacture marks a maximum and minimum oil level. If the level is maintained above the maximum, the excessive splash will carry oil to other parts of the system.

Since oil is not miscible with ammonia, any oil carried over will go to the lowest and coldest point in the system. Unless this oil is removed or drained from the system it will reduce the capacity of the plant. This is somewhat different than the low pressure job, such as "Freon-12" where the oil is circulated with the refrigerant. If the oil level goes below the minimum level the splash pins will not hit the oil and we will not get any splash to the connecting rods or in the case of force feed lubrication, the pump will lose its prime and this may result in burning out the bearings. This may also result in loss of lubrication to the packing causing the packing to burn and in turn resulting in a leaky stuffing box and scored shaft in the packing area.

To add oil to a system, attach a clean hose to the oil charging valve and place the hose in a container of oil. Next close the suction valve and pump a vacuum on the crankcase. By cracking the oil charging valve the oil will be pulled into the crankcase. Add oil until proper crankcase level is reached. Do not allow the suction end of the hose to become uncovered allowing air to be drawn into the crankcase. To drain the crankcase, close the suction stop valve and run the compressor until a vacuum is pulled in the crankcase. When the crankcase is pumped down, stop the compressor, close discharge valve and drain oil.

It will be necessary to loosen the cover plate and admit air to the crankcase before the oil will drain out. After the oil has been drained, remove the crankcase cover plate, thoroughly clean the interior with clean rags and fill with new ammonia compressor oil. Never use waste to clean the crankcase since lint left in the crankcase can cause trouble after the compressor is placed back into operation. This is especially true in the case of force feed lubrication where oilways may be plugged by the lint.

Packing

The packing for ammonia compressors may consist of a set of compound rings and a soft packing oil seal ring. Each compound ring is made up of a metallic ring overlaid with a filler ring. The packing must be installed as follows:

a—Clean and oil the stuffing box and shaft.

b—See that the steel bottom ring is in place.

c—Place a metallic ring around the shaft with the flange facing the connecting rods. Roll the ring down smooth with a wood block and if necessary cut off to provide 1/16" gap between ends.

d—Place the filler ring over the metal ring and stagger the gaps.

e—Push the assembled ring into the stuffing box as far as possible by hand, and the balance of the way by means of the spring retaining lantern gland and short sticks of wood. Do not use a hammer, hand pressure will be sufficient. Be sure that the parts of the ring have not become disarranged in the slightest degree, and that the metallic ring has not been injured by bending out of position. The number of rings to be inserted before the lantern gland, is shown on the packing arrangement print for the particular compressor, or is determined and noted as the old packing is withdrawn.

f—Insert the lantern gland and make sure this assembly lines up with the oil inlet hole.

g—Insert the neck ring. Then insert the additional rings using care to stagger all joints. Seat the rings firmly with hand pressure only. Finally install the oil seal ring and metallic neck ring and then bolt the packing gland against the housing.

The gas pressure in the crankcase will force plenty of oil into the packing, if the packing is properly installed. The oil seals the stuffing box against gas leakage and provides lubrication for the packing. If too much oil leaks from the packing, remove the gland and metallic neck ring and insert a split washer cut from any good grade of 1/8" sheet packing. After operating for several days, oil leakage should not be more than a drop every two minutes. Give the packing a chance to wear in.

Suction Valves

Suction valves are usually of the poppet type although some manufacturers use diaphragm, reed or other types. The poppet valve may be designed to use both opening and closing springs or a combination of opening spring and a cushion piston to balance the valve and smooth out operation. The opening spring is usually set to balance

the valve barely off its seat when under no load. The springs and/or the combination spring and cushion piston are designed to give quiet operation.

Noisy valve operation may be due to improper tension of the springs or wear of the cushion piston. When a cushion piston is used a small relief port is drilled through the cushion piston housing. Noisy operation may be reduced by peening the relief port partly shut to slow down gas relief and provide a cushioning effect.

The most common service operation consists of grinding the valve to the seat. This can be done with the use of a good grade of grinding compound. The top of the valve is usually machined to provide a screw driver slot or drilled holes to accommodate a spanner or other tool to turn the valve during the grinding operation.

Caution: Remove all traces of grinding compound from the valve assembly before placing it back into the compressor. The reason for this is obvious.

Discharge Valves and Safety Heads

The commercial size ammonia compressors, 3" and 4" base, are usually not designed to accommodate a safety head and safety head spring combination. This is apparently due to the fact that compressors in this category are usually hooked into a simple system where the gas returned to the compressor can be maintained in a dry state and normal operating conditions eliminate the necessity for this safety feature. This feature is a greater necessity on a larger compressor servicing a number of evaporators and where gas and operating conditions can not always be maintained at normal levels.

In the smaller compressors using a single discharge valve per cylinder the assembly consists of a valve, spring and cage, the valve seat consisting of a shoulder on the cylinder itself. Normal service consists of cleaning the various parts of all traces of carbonized oil and grinding the valve to the seat.

In larger compressors using multiple discharge valves (Fig. 4) and a safety head, the discharge valve seat in the safety head is usually replaceable. Replacement valve seats are usually furnished slightly oversize on the outside diameter to be dressed to a press fit on the job. This practice is followed because the recess in the safety head for the accommodation of the seat in most cases will be slightly larger than originally because of the press fit of the original seat. The use of the safety head adds a service operation since the head must be a ground fit to the cylinder.

Liquid Pumping

The compressor can be right mechanically, but the system will not produce desired results. It, therefore, becomes necessary to check the system after you have checked the compressor. The most common and the most serious compressor trouble is liquid pumping, either constant or intermittent. Liquid pumping can be anything from a stream of liquid coming back, to excessively low super heat. The minimum suction super heat should be not less than 10 F. in order to insure dry gas to the compressor. One of the best methods of checking the super heat is with a thermometer and the low pressure gauge. The effects of liquid pumping may not be apparent, but build up over a period of time. It may lead to scored cylinders, due to the washing of the oil from the cylinder walls. It may also lead to suction and discharge valve failures in the compressor since liquid is not compressible and a slug places terrific strain on the valves.

Some of the indications of liquid pumping are, low discharge temperature and frost or sweating on the outside cylinder walls. If the system has a high side float an over charge of refrigerant will cause liquid pumping. If thermostatic expansion valves

(Continued on page 78)

Fig. 4—Multiple discharge valves and safety head used on larger ammonia compressors.

Distribution of Refrigeration Equipment *Through Service*

BY H. T. McDERMOTT*

SHADOWS now evident on the business horizon cast their telltale signs of certain trends which have a significant meaning to those of us interested in the future of the refrigeration business. It is a changed condition when we again observe such signs as "January Clearance Sales—One-half Off"; advertising announcing immediate delivery on certain products; toilet tissue back on store shelves; and published production schedules of consistent monthly increases in the manufacture of many consumers durable products.

I recently read of one appliance dealer who offers free airplane rides to all customers who spend $25.00 or more for appliances—the length of the ride depending upon the amount of the sale, and believe it or not, some optimistic souls predict that it is quite likely this year an automobile salesman may drop into your office and courteously advise that he is anxious to sell you a car and can make immediate delivery of the model and style you prefer. "Thank you" is again becoming a part of the vocabulary of some sales personnel.

Yes, it would seem that the millennium may be around the corner—coming faster than we had anticipated. Possibly, those normal times we had talked about so long are now within the realm of possibility. How often have we heard the statement, "gosh, it will be a relief when we can go out and do some constructive selling rather than ignoring the phone because we know it is one of our good customers getting a little rough as three months have elapsed since we positively told him that he could expect his shipment without fail, barring the unforeseen, the following week." Well, the unforeseen must have happened, as we spent some good productive hours thinking up the next excuse until the situation got to the point of—"Hell, what's the use."

If we are to avoid over production in the future we must see that distribution keeps pace with our production capacity — thus the need for the "distribution engineer." In this article Mr. McDermott brings to the attention of these "engineers," the potentials of a ready built, nationwide sales organization—the independent sales and service group.

Selling is as exact a science as engineering. It was George Jones of Servel who, not too long ago, following V-J Day when we thought the step from war to civilian production could be accomplished without complications, stated that "top management has too long devoted its efforts to production, leaving the all-important job of finding markets for that production to men subordinate in fact, and subordinate in interests. The result being that we find ourselves with a Frankenstein Monster of production with no exact knowledge of how to control it." He further pointed out that engineering professions have gone through various cycles—the development of our country placed emphasis on the civil engineer; then, the period when utilities were being expanded to every community, emphasized the position of the electrical engineer; then, the day of the mechanical engineer who was responsible for the development of mass production methods. All these various engineering cycles had for their objective production and more production, for which we can be eternally grateful.

We moved into the Twentieth Century hell-bent on production. Then, several slumps, or as we like to dignify them, "business recessions" occurred. The best excuse for our dilemma seemed to be overproduction—but did we realize that perhaps our business illness could very well be diagnosed

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as a condition of under-consumption?

Our assumption, unlike that of the doctor who does not get the chance to correct his diagnosis when the patient is gone (or if he does) does not improve the situation—can be rectified. So let us assume we have the facilities to lick this under-consumptive condition—then, we are ready for our next big engineering cycle—the age of the distribution engineer.

His is no easy job. Better mousetraps are being built by more and better manufacturers, and I for one refuse to believe that the psychology of this generation is going to suggest it fight its way down the proverbial path to that mousetrap factory unless that path is well paved and situated conveniently on the much-travelled highway.

Americans are internationally known as a bunch of individualists and no denying they are "sore as hell" at those who have enjoyed a seller's market. They are, for the time being, remembering those times and those manufacturers who made those excuses; the arguments and time that they spent trying to secure some very necessary equipment and supplies when they know full well that some manufacturers' pet customers were certainly getting a better break than they were. They have promised themselves that the day is coming when the situation will be reversed and they will be sitting in the driver's seat in a buyer's market. Right now, they are thinking when the time comes "I will defy the 'so and so' to try and sell me anything." Fortunately, for us, we mellow just as easily and soon forget most of those drastic promises we made to ourselves.

It would seem logical, therefore, that our current day thinking should be pointed in the direction of distribution. Certainly, that type of thinking is going to be essential if we are going to support and exceed the one hundred and sixty billion dollar economy that is said to be necessary to support our present production. So, as engineers interested in the engineering phase of the business, make way and move over to welcome a new member of the profession—the distribution engineer.

A Path for Distribution

With this analysis of our present situation we consider one approach down the primrose path of distribution to customer acceptance of refrigeration through service, or should I say "better service." It is a pleasant experience to observe that a progressive group of engineers representing principally the manufacturing end of the business are equally interested in seeing the product get distribution after it has run the gamut of production.

My remarks are going to be principally confined to a means of distribution, which I feel I am somewhat familiar with, and which I must say with some regret, has been neglected by some manufacturers and dealers—your service department.

There Will Always Be Service

Yes, believe it or not, in spite of our many years' of technical improvements in production and manufacture, the service department is still a very essential part of our modern merchandising system. I am just wondering if the service department is still considered in some of our better circles as "a necessary evil." Have you wondered about those products that are "not guaranteed for years—not guaranteed for life—but guaranteed forever," and what would happen to them if the consumer did not know where to send that small amount of money to cover "mailing charges," so that the service department could keep on repairing it forever? Or those ads, that advise you of trouble-free service but usually let you know in prominent type that just in case—our service departments are located in the principal cities as convenient to you as your phone.

You might put this down in your memo book as a "believe it or not," that I do not believe this or the next generation, or the next, will witness the time when mechanical equipment, subject to every usage, will not be dependent some time upon the service department—atomic energy notwithstanding.

Service departments during the war made a major contribution to industrial progress. The personnel of these departments maintained the *one uninterrupted customer contact*—sales departments were quickly converted to the production side to help the all-out war effort. New equipment, except for high priority use, was not available. The only solution—keeping existing equipment operating for how long?—no one knew. The full responsibility for this job was that of the service department. Equipment was kept operating, and out of those conditions came a situation that few realized at the time would or could be a potent factor in postwar distribution.

It was our service man friend—the gentleman who was previously referred to as "the necessary evil." For the first time the customer fully realized what a service department—a service man—really was. It was during those days that many a consumer, with the help of the service department, learned how good the manufacturer had built his equipment. It was those days that many of us learned that automobiles had more useful miles than we ever believed possible back in 1940. In spite of every apparent handicap miraculously the impossible was accomplished—equipment was kept operating.

In the automotive industry, manufacturers were quick to envision the opportunity of maintaining sales contacts as well as a semblance of a sales organization for the day when they would be back ringing customers' doorbells.

The automotive field did a fair job of public relations work in letting their customers know of the availability and facilities of their service departments, and the competent personnel who manned these departments.

Service Kept the Customer

This intimate customer contact could have only one logical result. The customer became so well acquainted with the service organization and had the opportunity of learning first-hand the capabilities of its personnel that an explicit confidence was built up. This confidence was based not on promises or intangibles, but on actual knowledge of performance. What stronger relationship could exist between producer and consumer, especially when future sales are the prize?

The investment that the service man and service field made at that time is now paying some dividends.

Service organizations can be mainly divided into three classifications—those operating as dealer service organizations; the manufacturer's service organization and then another service group—that have literally lifted themselves by their bootstraps, and represent a mighty important group of buyers to parts and equipment manufacturers and those manufacturers who are interested in new sales outlets or expanding their present sales facilities, particularly in communities where their distribution is not as complete as they would like. It is that group familiarly known as independents—service men and contractors operating as a one-man shop or employing as many as 50. These independents have been coming along fast for the past fifteen years and today are established business men and recognized in their own communities as refrigeration specialists. Their experience has been gained the hard way because in the majority of instances they have started from scratch. They must make good with their customers. Their principal objective must be customer acceptance. They live with him constantly. They not only meet him in their usual course of business, but likely as not their social paths cross also. They are in most cases a community business, dependent upon community support. They are definitely interested in sales and some indication of this interest is shown in a survey in which, of the 1,304 who were contacted, 1,069 were actively engaged in the sales of new equipment. This group represents a ready-built sales organization.

Service Outlets the Answer

To manufacturers who are interested in the development of sales, especially in communities where sufficient local business does not justify the establishment of a profitable distributor or dealer without service facilities, the independent service organizations can be the answer. Last year it was reliably reported that the three hundred odd wholesalers organizations who deal principally in parts and supplies, did a business in the country conservatively estimated at fifty million dollars. Their customers principally represent these service men. These service men purchased replacement parts and supplies, as well as parts for new installations from these wholesalers. This is a market that cannot be ignored and one in which I am sure you are interested.

I think that Webster, among his many definitions, has aptly defined "Service" when he says "Service is anything supplied for accommodation," or get this—"Done to meet the needs of customers." I do not know anything that more objectively defines the principles of current-day business.

It would be apropos at this time to picture the modern refrigeration service man. He must be of good temperament—able to get along with people—including the sales department.

He must be a diplomat, have nice bedside manners if you please, because he meets the customer when he usually is in trouble and

may think of service in terms of additional expenses.

He must be a good practical application engineer. Have a general knowledge of the requirements of a diversified number of refrigeration applications. He must be a neat workman and neat in appearance. He must be sales-minded. At times he must be a good bill collector.

These are some of his major qualifications. Add them up and they make a substantial citizen.

In a franchised dealer's service organization, policies and operation are pretty well defined by the manufacturer's home office based on experience over a period of years. Naturally, such service instruction and suggested facilities are built around their own individual service requirements. Recognizing the intimate customer contact these service departments enjoy, they are continually taught the necessity of protecting the manufacturer's name in the field. It was, as mentioned before, these dealers service departments who were responsible for keeping many dealers in business when no equipment was available for sale.

Cooperation Needed

An indication of the lack of cooperation in some of these dealers sales-service organizations was mentioned to me a short time ago when a service manager of a large national manufacturer complained of how frequently literature intended for the dealers service department failed to reach its destination because some overzealous sales department individual figured it was of no importance — "or those service monkeys couldn't read anyway." Ridiculous, you say—yes—but it is typical of some operators' short-sighted policy.

Another type of manufacturers service department is that, I presume, represented by many of the organizations present this evening. Manufacturers of valves, fittings, controls, low and high-side equipment, throttling devices and those component parts that go into the making of the complete installation or self-contained equipment. Your problem may be somewhat different, because you sell to another manufacturer or through the wholesaler. Your contact may not be as direct to the service field, but your interest in their functions is equally important.

That product of yours is the finest piece of equipment manufactured. It gets into the field—you know not where, but this you can be sure of, it eventually will in most cases at sometime or another, meet up with our friend, "the service man." You are proud of your product so you modestly label it for all the world to see. You do this, I gather, because you recognize that the service man may like it so well that he will continue to recommend its use for customer acceptance.

Recognizing the position of the service department, what can it do to further build consumer acceptance through service? Whatever the service department affiliation—dealer, manufacturer, or independent, they represent a most important sales contact. They are building consumer acceptance for refrigeration, and can further expand potential sales if they receive the recognition in your sales program.

Remember, they are continually exposed to this customer contact. They get to these customers premises, not by sticking their foot in the door, but by invitation, and because of their position they have the opportunity of intimately knowing the customer's requirements—when equipment is due for replacement—when additional equipment is required. Oftentimes the customer volunteers the information as to new equipment he needs.

Service Files for Prospect Files

A good service department usually has a carefully recorded record of every installation that the company has serviced or installed. This record is an excellent prospect file, if properly used.

Encourage the work of the service department. Advise your customers of its facilities and capabilities. They want assurance that your equipment is backed up by a capable, service organization, equipped to meet any emergency.

One important thing the service man has learned is that one of his most valuable commodities is time. Therefore, rather than spend excessive time, which in the long run increases customer's cost, and because he is a business man, combining his many attributes with sales mindedness, he finds it more satisfactory for customer satisfaction to replace worn-out parts by the installation of new ones. His tinkering days are over. His future business demands customer acceptance and the fullest return of his time.

Your service department is a valuable contact for your engineering department. It is in the field that equipment is given the

(Continued on page 80)

Moisture and Drying Methods

By WALTER O. WALKER*

MOISTURE in refrigerating machines constitutes a most important problem for both the manufacturer and service man. Engineering has solved most of the mechanical problems in refrigeration, while producers have virtually eliminated difficulty due to refrigerants, unless they are mishandled. In the main, satisfactory lubricating oils have been provided, reducing trouble from this source to a minimum. However, moisture is still found in machines. Absence of moisture above an allowable minimum is absolutely essential to satisfactory machine operation. It is therefore imperative that moisture be eliminated during manufacture, that entrance of moisture in a system be guarded against in all field operations and when it does get in, removal be accomplished as speedily as possible. Moisture may be present in a system as the result of:

1. Faulty drying of equipment at factory and in service operations.
2. Introduction during assembly or service operations in the field.
3. Low side leaks, resulting in entrance of moisture-laden air.
4. Leakage of water condenser.
5. Oxidation of certain hydro-carbons of oil, to produce moisture.
6. Wet oil and/or refrigerant.

Item 1 will be discussed below, and items 2 to 5 may be corrected by proper servicing. Moisture is present in such small amounts in refrigerants and oils which are bought to specification and properly handled thereafter, that virtually no difficulty arises from these sources.

Effects of Moisture

The presence of moisture in a refrigerating system may result in one or all of the following undesirable effects:

1. "Freezing up" at expansion valves or capillary tubes, ice in evaporators.
2. Corrosion of metals to form sludge.
3. Copper plating.

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Ice separates from the "Freon" refrigerants, methyl chloride, methylene chloride, butane, and isobuntane, whenever the amount of moisture is sufficiently great and the temperature of the refrigerant low enough. The latter accounts for the formation of ice in expansion valves, capillary tubes and evaporators, but not elsewhere in the machine.

In low temperature units a frozen expansion valve or capillary tube may result, due to the separation of wax from oil methyl chloride or oil-"Freon" mixtures.[1] The presence of wax may be demonstrated by washing the expansion valve with a small amount of carbon tetrachloride, and evaporating the solution so obtained. White wax or an extremely viscous oil-wax mixture proves that wax is the offending element although it does not rule out moisture. The wax separation characteristics of the oil should be determined, and if the oil is not satisfactory another should be used.

The separation of water, as ice, is related to the solubility of water in a refrigerant. The solubility of water (ice) varies with the different refrigerants mentioned above, and is great enough in ammonia, carbon dioxide, and sulfur dioxide so that freeze-ups do not occur.

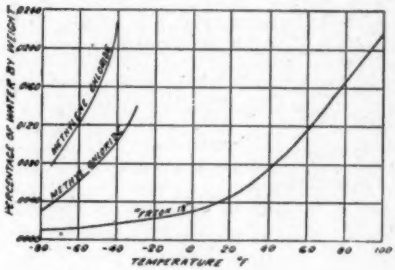


FIG. 1.

The greater the solubility of water in a refrigerant, the less likely that ice will separate. Fig 1 contains curves representing the solubilities of water in "Freon-12," methyl chloride and methylene chloride.

[1] *A complete reference list is included at the end of this article.*

Data are lacking for "Freon-11" and "Freon-114" but they are probably similar to "Freon-12." No data are available for butane and isobutane.

The corrosion of metals occurs whenever the quantity of water exceeds certain fairly well defined values.[3] Table 1 contains the results of tests conducted on steel in glass tubes where the quantity of water could be clearly defined.

Limits for copper, brass and aluminum are slightly higher in all three refrigerants. Aluminum in methyl chloride is eliminated from moisture corrosion consideration since a direct action occurs resulting in the formation of spontaneously flammable products.[4] Higher temperatures, encountered in the compressor and condenser, will lower these limits appreciably so that corrosion occurs with less moisture in a machine at these points, than with steel at room temperature.

The mechanism of corrosion, which results in the formation of metallic salts (sludges) has been studied.[5] Water reacts with sulfur dioxide, methyl chloride and "Freon-12" [5, 6] to form sulfurous, hydrochloric and hydrofluoric acids, respectively. These acids react with iron, copper and aluminum to form metallic salts (sludges) of well defined composition. By chemical analysis of these salts it is possible to demonstrate their origin as being due to water. Chemical analysis thus becomes important.

Corrosion in a sulfur dioxide system proceeds within a few days, or even hours, provided enough water is present, whereas it is much slower for methyl chloride and "Freon-12." This is due to the very rapid action of water on sulfur dioxide and the rather slow action of water on the other two refrigerants, to produce the acids responsible for corrosion.

In the presence of air, corrosion is much worse in all refrigerants except sulfur dioxide. Corrosion in a butane or isobutane system is due to the direct action of water and perhaps air, on metals. Approximately 90 per cent of the sludges produced in refrigerating systems are due to moisture[5]; the others are associated with oil, or minor causes.

Copper plating may be the result of the action of, or related to, moisture[7], but a relationship has not been established.

Consideration of the foregoing shows that the amount of water present in a refrigerating system must be small enough to avoid ice separation and corrosion.

With sulfur dioxide, corrosion alone must be avoided, which probably limits the maximum water content to below 0.03 per cent. The amount of moisture in an evaporator of a household unit is 7 to 8 times greater than in the liquid receiver.

Some limited information[8] regarding the water content of machines that are operating satisfactorily is given in Table 2.

These data indicate that the moisture tolerance of "Freon-12" is lower than for methyl chloride. This is quite generally borne out by experience in manufacturing and servicing. Since the quantity of moisture required to produce corrosion is well above that causing a freeze-up, elimination of freeze-ups should exclude corrosion of the type due to water.

There are three general requisites of a satisfactory process of drying refrigerating equipment, namely, heat, time and a method.

Table 1.

Refrigerant	% Water by weight	Results
Sulfur dioxide	0.03	Slight discoloration
	0.10	Slight scale
	0.15	Heavy scale
		Presence of air did not affect results
Methyl chloride	0.02	Slight discoloration
	0.03	Marked discoloration
		Very slight scale
	0.05	Moderate to heavy scale
		Presence of air increased corrosion in all cases
"Freon-12"		Similar to methyl chloride

Table 2. Moisture Content of Machines Considered Sufficiently Dry for Normal Operation

Company	Refrigerant	Water by Weight %	Type of System
A.			
1.	"Freon-12"	.0027	Large commercial
2.	"Freon-12"	.0026	Large commercial
B.			
1.	"Freon-12"	.0037	Domestic hermetic
2.	"Freon-12"	.0037	Domestic hermetic
3.	"Freon-12"	.006	Domestic unit returned due to moisture
C.			
1.	CH_3Cl	.0058	Small commercial
2.	CH_3Cl	.0058	Small commercial
D.			
1.	CH_3Cl	.007	Small commercial
2.	CH_3Cl	.005	Small commercial
E.			
1.	"Freon-12"	.002	Hermetic
2.	"Freon-12"	.003	Hermetic
3.	"Freon-12"	.008	Small commercial
4.	"Freon-12"	.002	Hermetic
5.	"Freon-12"	.002	Small commercial
6.	"Freon-12"	.003	Hermetic

a. Heat, which is necessary for the evaporation of water, may be applied by placing the equipment in an oven, using hot air or heating the apparatus with a flame, wherever possible.

b. Time is required for the evaporation of water, the elimination of water absorbed on the various surfaces and the removal of the water from the equipment with dry air or by means of a vacuum.

c. In general, higher temperatures cut down, but can not reduce the time requirement below a minimum, which must be set for each process, type of equipment and the degree of drying desired. A current of dry air drawn or blown through the equipment removes moisture as it becomes totally or partially saturated. The rate of flow should be high enough to avoid complete saturation of the air in order to minimize the danger of deposition of moisture in some cooler portion of the equipment. On the other hand, there is little to be gained by the use of a very high rate of air flow, since the amount of water removed per unit of air will be small.

Dry air may be manufactured by several methods, among which are:

a. Removing the major part of the moisture with a refrigerating unit, sulfuric acid or other drying agent followed by more complete drying in a unit charged with activated alumina, silica gel, Drierite or calcium chloride.

b. The use of a drier unit, charged with activated alumina, silica gel, or Drierite, and equipped with heating units (electrical or steam) for the regeneration of the drier. Normally, such units are provided in pairs, so that continuous operation may be assured. Fenwick[9] describes a unit which, along with others is commercially available.

Under some circumstances in the field, where the equipment can not be heated, anhydrous methanol (methyl alcohol) has been used to flush out moisture. The alcohol, having a lower boiling point may be removed more readily than water with a stream of dry air or the application of a vacuum. Under no circumstances should methanol in quantity be allowed to remain in the system, since it will produce corrosion. Methanol, in quantities somewhat less than one per cent, does not induce rapid corrosion and moreover exerts an anti-freeze action.

Vacuum

Air is evacuated from equipment by using mechanical vacuum pumps or, in some instances, water suction pumps.[11] The latter are not in general desirable since fluctuation of water pressure may cause them to

suck water back into the equipment being evacuated. Moreover, the vacuum obtained never exceeds the vapor pressure of the water used to operate the pump.

The boiling point of water is lower in a vacuum and consequently a lower temperature is required to evaporate moisture than at higher pressures. Water boils at approximately 104 F. and above, under 28 in. of vacuum, and at 59 F. and above, under 29.5 in. In general, temperatures much higher than these are employed with the vacuum method of drying.

Whether dry air or a vacuum is employed seems to make little difference, provided proper equipment is used for producing dry air or the desired vacuum, and the time and temperature requirement are met. A vacuum treatment, followed by breaking the vacuum with dry air, when the vacuum period is concluded, gives additional drying since the water, remaining as a gas, is removed by flushing with air. Anderson[12] has shown one very desirable feature associated with the use of dry air, namely: when air is drawn through equipment restrictions and plug-ups are revealed; when a vacuum is employed neither is indicated.

Practical Information Lacking

Little has been published concerning the drying procedures used by the major refrigerating machine manufacturers or employed by service engineers in the field. A few articles indicate the time, temperature, and moisture removal methods of a few procedures. The Westinghouse process for domestic units is described by Anderson as involving a series of nine units, an oven temperature of 257 F., the use of air dried (does not exceed dew point of –58 F.) with calcium chloride and potassium hydroxide and admitted under controlled low pressure and a time (not revealed) sufficient for complete drying. A moisture test is made on the ninth unit.

Wile[13] describes, in very general terms, the drying method used by Savage Arms Corporation, for ice cream cabinet units. Better than ordinary drying, necessitated by the low temperatures involved, is attained by "dehydrating each piece of equipment . . . at high temperature and a very fine vacuum." This procedure apparently results in systems sufficiently dry, but silica gel drier units are placed on each machine as an additional precaution.

A general article[6] gives a drying procedure for sulfur dioxide machines, which includes heating in an oven at 250-275 F. under vacuum (greater than 29.5 in.) for 4 hrs. This is claimed to reduce the moisture content of the machine to approximately 0.0095 oz. of water per cu. ft. of internal machine volume. As a means of removing the water vapor remaining in the machine, flushing with dry air is advocated. A discussion of drying by vacuum treatment at room temperature and flushing with dry air is also included in this article.

A number of articles have been written covering drying procedures employed by service men. Newcum[11] describes a method and apparatus for cleaning and dehydrating equipment in the field which involves drawing a vacuum on the system while heating it progressively toward the outlet connected to the vacuum pump. When this process is finished, dry, hot air is admitted through a drier unit for some time. Properly carried out, this procedure should result in dry equipment. Fenwick[9] describes a system and apparatus for producing dry air and for drying units in the field as well as in the factory. Details of operation are given. A dehydrating unit which can be built in any well equipped shop is discussed by Dinsmoor.[14]

Control of Drying Operations

Proper control of drying operations is necessary if moisture difficulties are to be avoided. How may the manufacturer be certain that all equipment is dry and what routine checks may be used to catch "wet" machines before they reach the customer? Routine checking of the finished machine varies with the type of drying process employed. Where a stream of air is used, a dew point determination of the out-going air has been employed. Fenwick[9] advocates the use of a dew point of –40 F. (equal to 0.046 gr. water per cu. ft.) for the air leaving the equipment, as proof that it is dry.

Anderson[13] determines the residual moisture in the last machine of a series, which has been dried with air, by drawing off the moisture into a liquid air trap and from this calculating the quantity in the machine.

McGovern [6] recommends drawing a vacuum on the equipment being tested, closing off the system and observing the pressure rise, if any. If no pressure rise occurs after a time, the machine may be considered dry, since moisture remaining in the machine will create its own gas pressure.

Moisture may also be determined by removing a portion of the liquid refrigerant from a machine which has been operated for several hours and until the moisture is in equilibrium throughout. The quantity of moisture in the removed sample is determined by the phosphorous pentoxide method.[15] Recently Walker and Rinelli[16] developed a method applicable to methyl chloride, methylene chloride and the "Freon" refrigerants which makes possible routine analysis of a very large number of machines.

A standard[17] for refrigerant system tubing and cooling coil has been set at a maximum permissible moisture content of 10.6 milligrams per liter (300 milligrams per cu. ft.) of internal volume. A method for determining the moisture content was outlined.

After a machine has been installed, overhauled, recharged, etc., moisture is a very frequent cause of trouble. In the absence of other difficulties, a machine may be put into satisfactory operating condition by the removal of moisture with a drier. A drier is a chemical compound capable of absorbing, or reacting chemically with the moisture contained in the liquid or gaseous refrigerant-oil mixture. The drier is placed in a suitable unit, equipped with screens and filter pads to prevent the solid drier from entering the refrigerating system. The drier unit, in addition to holding the drier, functions as a filter and removes any solid found in the liquid or gaseous refrigerant reaching it.

There are several substances which have been used as driers in the chemical laboratory. Information concerning these driers has been published in a series of papers.[18, 19, 20] The data from these papers are not applicable directly to the problem of drying a refrigerant and consequently more is to be gained from several general articles[21, 22, 23, 6, 24, 3].

In order that a chemical substance be acceptable for use as a drier, it must possess, in addition to the property of water removal, characteristics which eliminate any possibility of undesirable reactions with the refrigerant, oil or machine parts.[6, 24] Activated alumina, silica gel, Drierite, calcium

Table 3. Drying Power of Various Materials

Drier	Refrigerant	Liquid or Vapor	Maximum Residual Moisture,* % (Initial Water Concentration) .25%	.02%
Activated alumina	Sulfur dioxide	L	.15	.005
		V	.01	
	Methyl chloride	L	.02	.006
		V	.01	
Silica gel	Sulfur dioxide	L	.15	.006
		V	.01	
	Methyl chloride	L	.01	.004
		V	.01	
Drierite (calcium sulfate)	Sulfur dioxide	L	.15	.009
		V	.08	
	Methyl chloride	L	.05	.005
		V	.04	
Calcium chloride $CaCl_2$	Sulfur dioxide	L	.09	.013
		V	.03	
	Methyl chloride	L	.10	.005
		V	.04	
Calcium oxide CaO	Sulfur dioxide	L	.20	
		V	.15	
	Methyl chloride	L	.15	
		V	.08	
Barium oxide BaO	Sulfur dioxide	L	.20	.017
		V	.15	
	Methyl chloride	L	.05	.006
		V	.05	
Zinc	Sulfur dioxide	L	.25	
		V	.25	

* Excluding samples which were of definitely poor grade.

oxide and calcium chloride have been most widely used, the first three being rated highly acceptable.

Table 3 contains the results of tests[3] and show the relative efficiency of several driers.

A brief discussion of the various driers which have been and/or are being used in the refrigeration industry is given in the following.

Activated alumina[25] is a granular aluminum oxide which removes moisture by absorption. It also absorbs acids. It dusts slightly on handling but this is not a source of trouble. It has had extensive and satisfactory use with sulfur dioxide, methylene chloride, methyl chloride, "Freon 11" and "Freon -12," used with sulphur dioxide in vapor phase (suction line) only, with other refrigerants in either suction or liquid lines, usually the latter. It may be left on machine indefinitely.

Silica gel[26] is a glass-like silicon gel which removes moisture by absorption; does not dust. See additional remarks under activated alumina. It also absorbs acids.[27]

Drierite[28] is anhydrous calcium sulfate prepared as a granular white solid. It removes moisture by chemical action. It dusts somewhat more than activated alumina but this does not cause trouble. Drierite is also cast in sticks. See additional remarks under activated alumina.

Calcium oxide removes water and acid by chemical action. It dusts somewhat. It can not be used with sulfur dioxide but is satisfactory for other refrigerants. It rates as a fair drier with tendency to powder when excess moisture is present.

Calcium chloride removes water by chemical action and is not rated as a drier capable of reducing the moisture content to a low level. It may be used with all refrigerants. Excess moisture produces a solution of calcium chloride which is highly corrosive. It will not remove acid. Unlike activated alumina, silica gel, Drierite and calcium oxide, it should not be left on a machine longer than a few days, and calcium chloride should be used with caution.

Barium oxide removes moisture by chemical action but should be used with care since it has been known to cause explosions.[24] It powders considerably after reaction with water.

Magnesium perchlorate, barium perchlorate. These are powerful oxidizing agents and have caused serious explosions with oil and methyl chloride.

Phosphorous pentoxide is an excellent drier, but its fine powdery form makes it difficult to handle and produces extensive resistance to flow of gas and/or liquid. A mixture with quartz[29] has been accorded limited use.

Soda lime is a mixture of calcium oxide and sodium hydroxide. Its use has been limited and it is not recommended as a satisfactory drier.

Factors in the Use of a Drier

Since a drier is extremely sensitive to moisture, it must be protected from it at all times until ready for use. Handling a drier in moist air must be avoided, and for this reason it is recommended that the drier be obtained in a factory packed unit, or that it be prepared for use in the unit under conditions which will preclude contamination by moisture.

The position of a drier unit on a machine is important. A liquid feed line should enter the drier unit at the bottom with the exhaust at the top. This arrangement will insure the most uniform contact between refrigerant and drier. By this arrangement, any entrained oil globules, in liquid sulfur dioxide for example, will be floated out of the drier and will not be as apt to plug the surface of the drier particles. If a drier is placed vertically in the suction line, the feed should be at the top with the exhaust at the bottom in order that the oil may be blown down through and out of the drier unit.

A very important factor bearing on the whole problem of the use of a drier is the question of rate of moisture removal and the time a drier unit must be left on the machine. A critical glance at the problem will show that the time is longer than is often assumed. To take a specific example, suppose that three drops of water get into an otherwise dry system containing 3 lbs. of refrigerant. These three drops of water would amount to about 0.02 per cent moisture. Since this amount of water in methyl chloride is sufficient to cause discoloration of steel and may freeze out at temperatures slightly below zero, it would appear advisable to dry the system down at least to 0.01 per cent moisture. Suppose now that 0.5 lb. of methyl chloride circulates per hr., which would represent a typical normal load in a household machine. Then in the first hour, not over 1/6 of the moisture would be re-

(Continued on page 80)

SERVICE POINTERS

A department for the exchange of ideas on new devices and methods of improving service work. Five dollars is paid for each pointer published. Write up your idea today and mail it to the Service Pointer Editor.

HERMETIC MOTOR COLOR CHART

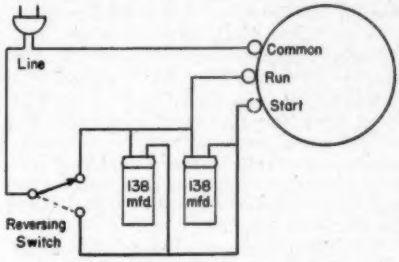
THE common, starting and running winding connections on a hermetic unit can always be determined with an ammeter, or if you are familiar with the type of relay used, the wiring can be traced in order to determine which winding you are dealing with. It is much easier, though, to refer to a color chart such as the one shown here. It is not complete but it does contain all of the most popular hermetics.

Color Schemes	Motor Windings	Units
Black White Red	Starting Running Common	Crosley
Red Black White	Starting Running Common	Frigidaire Westinghouse Servel
Red White Black	Starting Running Common	Gibson Grunow
White Red or Green Black	Starting Running Common	Coldspot Copeland G.E. Kelvinator Leonard Norge Philco Tecumseh

REVERSING HERMETIC MOTORS

BECAUSE of the narrow tolerances and the close balance between compressor load and motor capacity, hermetic units may occasionally stick and refuse to start, particularly after a long and heavy pull on a hot day. The overload device will continually kick off and any efforts at starting will fail. Usually such units are condemned and either returned to the factory for replacement or taken to the shop for opening and rebuilding.

On the other hand, if some external means of breaking them loose can be employed with success, the unit will continue to operate indefinitely without further trouble.



By making connections to the three motor terminals of the hermetic unit as shown in the accompanying diagram, and inserting two 138 Mfd. capacitors in parallel, the motor can be reversed. Flipping the switch back and forth causes a rocking motion on the compressor which will break it loose.

When using this motor starting device, disconnect the relay and all other connections to the motor terminals.—*Submitted by J. M. Gantt, Montgomery, Alabama.*

EMERGENCY RELAY

WHILE stationed in Scotland I made two emergency starting relays.

One of them was for a Copelametic unit on which I discovered the starting relay had been taken off and wasn't to be found. Without too much difficulty I secured a generator cut-out, took all the winding off, and rewound with No. 12 enamel wire. Then I connected one of the leads to the power, and one to the motor. The points of the cut-out served as the starting contacts. The spring tension of the cut-out can be adjusted so as to disconnect the starting winding at any desired speed. A generator cut-out from any automobile will serve the same purpose.—*Submitted by Ray Carver, Leesburg, Fla.*

ANSWERS TO YOUR FREEZER CUSTOMERS' QUESTIONS

"IF THE electric power is disrupted, what happens to the frozen foods in a home freezer?"

"How often should you defrost a freezer?"

"Can thawed products be refrozen?"

These are questions frequently asked about the home freezer. And here are the answers, according to tests made in the General Electric Consumers Institute, together with a simple plan for correct care of the freezer.

Power failure is rare. Breakdowns don't usually last for more than several minutes or a few hours. Even so, if the unusual does occur disrupting power for several days, no spoilage of frozen foods should result in a well-insulated, well-filled freezer because it takes some time (the exact length depends on the room temperature) for the inside temperature to climb from zero to 32 F. It is well to know what should be done to protect foods, however, should the duration of an outage be indefinite.

The first precaution is to keep the cabinet closed, to conserve as much refrigeration as possible. If dry ice is available, several pieces scattered on top of the food packages will maintain the required low temperature.

Where no dry ice is available, and an extended electric service breakdown is experienced, it may be necessary to place the foods in corrugated paper cartons and take them to a cold-storage warehouse or locker plant.

If partial thawing has occurred before refrigeration is resumed, you can safely refreeze any packages in which some ice still remains.

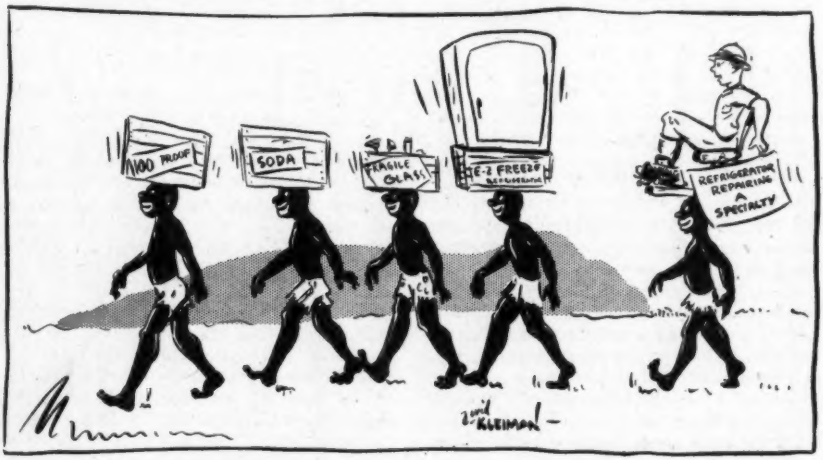
If complete thawing has occurred, the various products should be handled differently: Fruits may be refrozen, or used for high-quality jams, jellies and preserves. Completely thawed meats, poultry and fish can be refrozen if careful examination of each package shows that they still smell fresh. But completely thawed shell fish and vegetables should NOT be refrozen. They may be cooked for immediate use if the temperature of the cabinet has not risen above 50 F.

It is important that any thawed or partially thawed packages be refrozen promptly. If the quantity is large, the packages should be taken to a locker plant or commercial cold storage for refreezing.

In case you wish to shut down your home freezer for some reason, here's what to do: (1) Turn it off, (2) remove all contents, (3) completely defrost and clean the interior, mopping all water out from the bottom, and (4) leave the lid open.

Defrosting is necessary when the frost accumulation has become thick enough to interfere with the closing of the home freezer lid, or with the efficient use of the freezer. To defrost, take a spatula or piece of hard wood and scrape the frost from the strips and the liner walls. Do not use a pointed, sharp instrument, such as an ice pick.

If you remove the foods for complete cleaning of the cabinet, place them in a cardboard container or wrap them in insulating material, such as newspapers.



On Problems of Servicing and Installation of Refrigerating Equipment—Send Your Problems to the Question Box.

CHECK VALVE DEFECTIVE

QUESTION 787: I have an Alaska Model Norge and I think my trouble is in the evaporator. With the suction line shut off the unit will pull down a good 28-inch vacuum, pressure 75 lbs. I open valve up and the vacuum stays at 28 inches. There is no sound in the evaporator. Can you put me straight on this unit?

ANSWER: I believe that your trouble with the Alska model Norge refrigerator is either in the screen of the evaporator or with the check valve in the suction side of the compressor. The most probable cause is the check valve in the compressor, since that could become jammed or stuck so that it does not open.

The check valve is in the suction shut-off service valve of the compressor. The service port opening in the valve is between the compressor and the check valve, so that pressure readings would be of the actual compressor operation. This would most likely account for the fact that the pressures remain on a deep vacuum even after the suction valve is open.

FREEZER HAS ITS TROUBLES

QUESTION 788: We are having difficulty with a 15 cu. ft. Ace freezer. It is a self-contained freezer powered by a CM365C ⅓ hp. General Electric condensing unit. It was purchased new in the spring of 1946. In August, the condensing unit developed a leak at the condenser intake. The manufacturer replaced the unit with a new one of the same make and size. It operated perfectly until a short time ago. At that time the owner noticed ice on the liquid and suction lines and pounding noise in the motor. The Ace people advised him to have a new thermostatic valve installed. The original valve was a Detroit No. 894. The mechanic replaced that with an AP 207, but the frosting and pounding continued. The pounding would continue until the overload would stall the motor. In an attempt to stop the pounding, he continued purging the system until all of the F-12 was gone. He then recharged the machine and we were called in.

We found the compressor would hold a 24" vacuum, but when connected into the system the liquid line would frost from the top of the receiver and the frost would continue to the suction port of the compressor. There was also evidence of frost on the bottom of the receiver. The head pressure quickly built up to 240 lbs. A line was then run from the compressor outlet to the receiver inlet and gas was pumped through the receiver and out through the condenser. The liquid line to the valve was then reconnected as was the discharge line from the compressor to the condenser and gas put back into the machine. There was no more frosting of the liquid line, but the suction line continued to frost. An attempt was then made to increase the superheat setting of the valve. After about three turns on the valve adjustment, the head pressure would shoot up to 240 lbs. When the valve adjustment was reversed a quarter turn, the head pressure would drop back to normal (around 90 lbs.; room temperature 20 F.). However, the frost would not recede on the suction line.

Dirt in Sight Glass

This is a type of reaction we have never previously encountered and would like to have your comments. When the first mechanic changed expansion valves, he also removed a 2½ cu. in. Mueller silica gel dehydrator. We installed a 15¼ cu. in. Mueller silica gel dehydrator. The sight gage also had to be changed because the bull's eye was black and no reading was possible. The dirt on the bull's eye did not come off even after soaking in carbon-tet. The bull's eye of the second sight gage remained clear as long as we continued to operate the machine. The AP valve was purchased from a jobber the day before it was installed. I think the code on the container was A1544.

The suction pressure did not make any sudden gyrations, but remained on a normal course between 22 and 26 lbs. The unit is controlled by means of a temperature control. The feeler bulbs of the temperature control and the expansion valve are clamped in a double receptacle fastened to the side of the freezer next to one of the freezer plates.

ANSWER: There are two or three things that stand out as possible sources of trouble in your description of the Ace freezer. First of all, the frosting which occurred at the receiver and continued through the evaporator to the suction port of the compressor apparently was caused by a plugged or restricted condenser. Most likely the restriction was near the outlet of the condenser or right at the entrance of the receiver.

Another indication of a restricted condenser is your statement that "An attempt was then made to increase the superheat setting of the valve. After about three turns on the valve adjustment, the head pressure would shoot up to 240 lbs. When the valve adjustment was reversed a quarter turn the head pressure would drop back to normal." This would indicate to me that the condenser was not able to handle the increased back pressure to the compressor, and it may be caused by either a restricted condenser or a dirty condenser which is not working up to its full efficiency. These two parts of your description would seem to indicate that the system is dirty and requires a thorough cleaning to overcome that part of the trouble. Further on, the dirt was again indicated by the fact that the bull's eye was black and whatever the substance coating it was, it was not easily removed with carbon tetrachloride.

Wrong Bulb Location

This dirt in the system could also affect the expansion valve. However, I think that your main trouble with the expansion valve is in the location of the bulb. You state that the feeler bulbs of the temperature control and expansion valve are clamped in a double receptacle fastened to the side of the freezer. This arrangement would cause quite a lag between the time frost reached the end of the evaporator coil and the time the expansion valve would feel the temperature change.

If the freezer were empty the time lag would be much shorter, but as the freezer is loaded, and each time a new batch of products were added, the time lag would become greater. The natural result is that the expansion valve will remain in the open position much longer than it should and cause frosting of the return line and probably flooding of the compressor with liquid refrigerant. I would suggest that the feeler bulb be attached to the suction line near the outlet of the last freezer plate, and if this does not bring the proper results, move the bulb to the plate itself.

FROM DIESEL TO ELECTRIC

QUESTION 789: I have a change-over to make in an ice plant. We are running Frick verticle compressors with Diesel engines connected direct. We must take out one Diesel and install motor or two motors. What size motor will I need to replace 147 hp. Diesel? Speed 375 r.p.m. The compressors are 7 x 7 and 9 x 9—twin cylinder. Head pressure runs up to 225 lbs. psi. in hot weather. Can you advise size of motor to use on each compressor or one motor for both? Current is AC 220 V. 3 phase, and we can get 440 V. if necessary. Can you give me formula for working out size of two motors?

ANSWER: We understand that the machines are operating in an ice plant. Unless the changeover involves some other kind of cooling work, we are probably safe in assuming that the suction pressure is between 20 and 25 pounds gauge.

The 7 by 7 machine should then have a 50-horsepower motor. The larger compressor would require a 100-horsepower motor. This big motor would undoubtedly be of the synchronous type, 100 per cent power factor (360 rpm.). If both machines are driven from a 150-horsepower motor placed between them, it should also be of the synchronous type.

The 7 by 7 compressor, if driven separately, would probably have a squirrel-cage induction motor; this should be wound for high starting torque with low current inrush.

Many Factors to Consider

Any formula showing the size of motor for driving a refrigerating machine would be likely to mislead one, as there are so many variables to be considered. These include the bore and stroke of the cylinders, the number of cylinders, the efficiency of compression, the speed, the suction pressure, the discharge pressure, the mechanical friction, the type of drive, expected overloads, etc. The machine manufacturers have worked out tables from which the horsepowers can be calculated to meet any given set of conditions.

However, it would be advisable to have a representative of the maker of the machine, check over the installation to make sure that the necessary fly-wheel effect, outboard bearings, and suitable starters were provided.

This is the beginning of a series of articles on the subject of estimating refrigeration jobs of several different natures. They are designed to help the less experienced contractor bid on an equal footing with the older contractors. In the articles to follow, the author will explain how to estimate the cost of installation jobs, major repair jobs, contract service and other work.

Take the Guess out of

Estimating

By DONALD F. DALY

ESTIMATING refrigeration installation costs is a cinch. All you need is a knack for the work and twenty years experience. That's what the Boys tell me—and the Boys should know. They've been at it long enough. I interviewed some of the most successful contractors in this area with the idea of finding out how the experienced operator was conducting his estimating at this time. I was also trying to dig out some of the secret methods they use so I could pass them on to you. I was hoping that someone had hit on a formula that would take the drudgery out of estimating and would enable the newcomer to this field to compete on even terms with more experienced contractors.

I also wanted to dig into this subject because I have not done much estimating in the past few years and I was anxious to know if any advances had been made in estimating methods that I could turn to my advantage. I am fortunate in having a wide acquaintance among refrigeration men around here. "Well," thought I, "What's the use of having friends if you can't use them." (I'll bet some of this friendship has cooled in the past few weeks. I've been heckling Hell out of them). So, with this happy idea in mind I set out to interview some of these men. To say that the results of these interviews was surprising is putting it mildly.

The first man I called on—Alex Johnston of Pacific Marine Refrigeration—almost threw me out of his office when I brought up the subject of estimating. "How in Hell," roared Alex, "can anyone estimate these days? I contract for material and then find that I can't get delivery. I have to hold my men on the payroll or lose them. This often doubles or triples my labor cost. I get all of the main items that go into a refrigeration installation and then find that I am held up by some insignificant fitting that can't be found. You tell me how to estimate!" It seems Alex has been having his estimating troubles lately.

The next man I interviewed—Fred Esser of Refrigeration Components—had a somewhat different slant, but his reaction to my questions were equally surprising. "You mean guesstimating, don't you," said Fred. "We haven't done any real estimating for several years. During the war when most of the work was done on a cost plus basis and competition was almost non-existent, anyone could get by in the refrigeration contracting business. But now that business is getting back on a competitive level a lot of the Boys, especially the men who started during the war boom, will have to take another look at their hole card. We believe that the days when a man could guesstimate a job are gone. Forever. We hope. We were in business when competition was very tough and we will welcome a return to such conditions. At least a man will know where he stands. In the meantime we are taking it slowly. It is better to lose a job than to take it at a price that won't show a profit. Although the way some of these guys are bidding you wouldn't think so."

The third man I interviewed—Ed Bass of Condenser Repair Company, had much the same story but he was a little more philosophical about it. When I asked him how he managed to operate under such conditions he grinned like the cat that ate the canary and said, "You gotta have intuition, Bud. That's the only way you can work it. You gotta have intuition. We are being very cagy in our bidding. Yeah. We got our fingers burnt too. A lot of people are talking about getting back on a competitive basis, and that's all to the good. But I don't see how it can be done until material is available in greater quantities. In the meantime I recommend intuition." (What a character.)

Interviews with a dozen other contractors brought the same results. All agreed that refrigeration contracting was getting back on a competitive basis. That sloppy estimating practices would no longer serve. Either contractors will have to learn to estimate care-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WHEN YOU

WHEN YOU NEED FASTER, CLOSER, MORE ACCURATE CONTROL OF EVAPORATOR PRESSURES

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Once you've used the A-P Model 235, you'll call it "indispensable" on any system where you must maintain closer-than-ordinary control of evaporator pressures. Installed at the end of the evaporator, this special valve maintains a constant evaporator pressure regardless of changes in load or variations in suction pressure on the outlet side of the regulating valve. *There can be no variation* in pressure — or box temperature — because of its instantaneous response to pressure changes.

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Model 235-S can be adjusted to proper setting IMMEDIATELY, with the handy adjusting knob, and collar graduated in pounds pressure from 0" vacuum to 40 pounds — *no waiting for system to settle down.* No other valve has this time-saving feature.

You'll find the Model 235-S Suction Pressure Regulating Valve particularly valuable where two or more evaporators must be operated at different temperatures with a single condensing unit, as in multiple installations. Installed on the warmer evaporator, the valve can be quickly adjusted to the required pressure of each by means of the top adjusting knob. Of the "throttling" type, it tends to close off gradually, producing no sudden change to cause erratic operation of the balance of the system.

Put this valve on your next multiple system and watch it quickly go to work steadying those fluctuating pressures to new accuracy. Your jobber has the Model 235-S in stock — or write for bulletin M-110.

AUTOMATIC PRODUCTS COMPANY

(A-P) Dependable REFRIGERANT VALVES

SERVICE ENGINEERS

fully or go broke. The smart ones are going to take it easy until they find out how things go. As Fred Esser put it, "There's no use taking a job if you can't make a little money on it."

Well, all this was very interesting, but it wasn't helping me to learn the secrets of estimating. From this point on I tried to stay off general business conditions and concentrate my efforts on trying to find out how estimators estimate. I was still in hopes of finding that secret, short-cut, method. Eventually I arrived at the conclusion that, 'there ain't no such thing.' Some of the men I talked to brushed me off with, "I'm not putting out any information. You'll have to find out the same way I did. The hard way." Others were willing to tell me anything I wanted to know but didn't quite know how to go about it. They all agreed that nothing could take the place of experience. Another instance of having to have the experience before you can do the job, but not being able to get experience without the job.

If the general trend of twenty or thirty interviews were condensed into a short paragraph it would go something like this. "How can I tell you how to estimate. I don't have any set formula. When I look over an installation I know from past experience just about how many man-hours of labor it will take to do that particular job. I know how many condensing units, coils, fittings, pipe, and etc., that are required. I also know the cost of this material. I give a price for the job that I know will cover the labor and equipment and give us a fair profit. How can I do this? Well in the past twenty years I have probably done fifty jobs that are almost an exact duplicate of this job. I have all the facts and figures for these past jobs. Now all I have to do is look for any features about this job that might be out of the ordinary and might require more than the usual amount of labor and material. Then I check with my supply house to find out if they can supply the main portion of the material and at what price. That's all there is to it. It's a cinch."

At this point I suppose I would have been justified in giving up and saying "To Hell with estimating." But I am a very stubborn guy. It has been said that if you really want to learn a subject—write a book about it. The material that follows is drawn, partly from my own experiences as an estimator and contractor, and partly from the information I was able to glean by interviewing many of the successful contractors and supply house operators in this area. I also interviewed some who were not so successful. I lay no claim to being an expert on estimating, and no doubt experienced estimators will be able to pick my methods to pieces. Never-the-less, the essentials of estimating are here. I offer it for what it is worth.

ASRE SPRING MEETING

THE 34th Spring Meeting of The American Society of Refrigerating Engineers will be held in Los Angeles, Calif., June 9 to 11, 1947, it has been announced by R. H. Money, president of the Society. This is the first national meeting of the ASRE to be held on the West Coast in 30 years.

The program for the three-day session will include technical papers on hydrocooling and precooling, new developments in refrigeration lubricants, refrigeration in motion picture laboratories, and several papers on various aspects of food freezing. Committee meetings and social events are scheduled to supplement the technical sessions.

The Los Angeles Section of the Society will act as host for the occasion and general arrangements are being made by a committee under the chairmanship of Arthur Hess. The Hotel Alexandria will serve as headquarters for the meeting. Edward Simons of the San Francisco Section is acting as program chairman for the meeting.

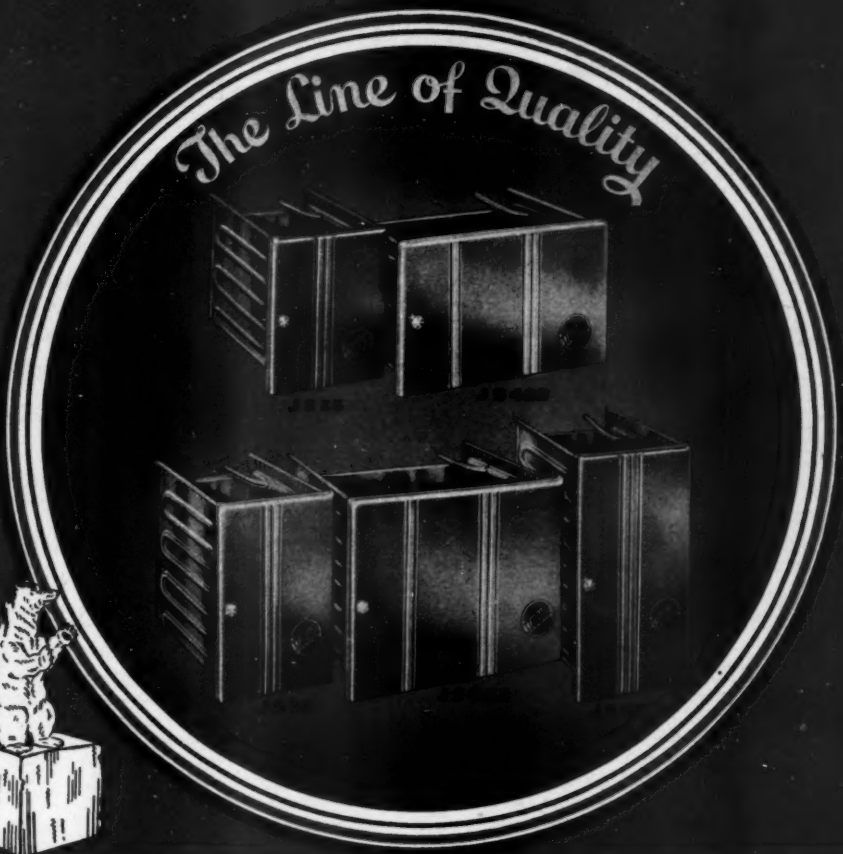
Special arrangements are being made for several railroad itineraries from the east to include stopovers at interesting and scenic points along the routes. It is expected that many members will combine their summer vacation with a trip to the meeting.

SHIPMENTS OF REFRIGERATION, AIR CONDITIONING EQUIPMENT

SHIPMENTS of all major classes of components and accessories for air conditioning and commercial refrigeration equipment during the third quarter of 1946 continued the upward trend begun during the first half of the year, according to a report released by the Bureau of the Census. There was a 14 per cent increase in dollar value of the shipments of the entire industry, from $27 million during the second quarter to $31 million during the third quarter. The greatest percentage increase for a specific product took place in shipments of room type air conditioning units, which rose 34 per cent over the combined value of shipments of first and second quarters (from $1.6 during the first half of the year to $2.1 during the third quarter). Shipments of other products increased as follows between the second and third quarters of the year: centrifugal refrigeration machines, 22 per cent; compressors and compressor units, 17 per cent; condensing units, 16 per cent; and heat exchanger equipment, 10 per cent.

This release is based on reports submitted by 72 manufacturers; one additional company became active during this quarter (71

STANDARD EVAPORATORS



MODEL No.	JS-25	JS-422	JS-35	JS-633	JS-45
Trays	1 Single 1 Double	2 Single 2 Double	1 Double 2 Single	4 Single 2 Double	3 Single 1 Double
Cubic Ft. Capacity	4 to 6	8 to 10	5 to 8	10 to 12	9 to 12

SOLD THROUGH LEADING REFRIGERATION WHOLESALERS

Standard Refrigeration Company

20 NORTH WACKER DRIVE *CHICAGO 6, ILLINOIS*

manufacturers were included in the corresponding section of the survey for the first and second quarters of 1946).

The shipment statistics included in the report apply to equipment actually billed and shipped. These figures are equivalent to completed sales. Complete units delivered on consignment or shipped to a branch warehouse for stocks are not included. The dollar values shown are the manufacturers' net billing prices, f.o.b., factory. The data for some types of air conditioning and refrigeration equipment have been combined in the tables of this report to avoid disclosing the operations of individual companies.

TABLE I.—AIR CONDITIONING EQUIPMENT AND COMPONENTS AND ACCESSORIES FOR AIR CONDITIONING AND COMMERCIAL REFRIGERATION EQUIPMENT: SUMMARY OF SHIPMENTS BY MAJOR CLASS OF PRODUCT, SECOND AND THIRD QUARTERS 1946

Product	Third Quarter 1946 Shipments of Complete Units						Second Quarter 1946 Shipments of Complete Units					
	Total		Domestic [1]		Export [2]		Total		Domestic [1]		Export [2]	
	Number	Value (dollars)	Number	Value (dollars)	Number	Value (dollars)	Number	Value (dollars)	Number	Value (dollars)	Number	Value (dollars)
SECTION I—COMPONENTS AND ACCESSORIES												
TOTAL	xxx	31,232,155	xxx	29,615,831	xxx	1,616,324	xxx	27,309,240	xxx	25,746,332	xxx	1,562,908
Condensing units	183,354	14,379,003	176,231	13,453,306	7,123	925,697	166,451	12,352,884	158,643	11,583,185	7,811	769,699
Ammonia refrigerants	260	255,584	231	230,246	29	25,338	347	361,175	321	331,201	26	29,974
Refrigerants except ammonia	183,094	14,123,419	176,000	13,223,060	7,094	900,359	166,107	11,991,709	159,322	11,251,984	7,785	739,725
Air cooled	172,855	10,742,050	166,664	10,121,535	6,191	620,515	157,159	9,110,666	149,823	8,474,843	7,336	635,823
Water cooled	10,239	3,381,369	9,336	3,101,525	903	279,844	8,948	2,881,043	8,499	2,777,141	449	103,902
Compressors and compressor units	32,207	4,023,397	30,401	3,754,472	1,806	268,925	48,182	3,448,211	42,021	3,098,767	6,161	349,444
Ammonia refrigerants	857	1,637,586	756	1,477,182	101	160,404	715	1,202,319	602	1,017,701	113	184,618
Refrigerants except ammonia	31,350	2,385,811	29,645	2,277,290	1,705	108,521	47,467	2,245,892	41,419	2,081,066	6,048	164,826
Centrifugal refrigeration machines	89	1,927,319	84	1,851,891	5	75,428	78	1,582,604	71	1,467,040	7	115,564
Heat exchanger equipment	xxx	10,902,436	xxx	10,556,162	xxx	346,274	xxx	9,925,541	xxx	9,597,340	xxx	328,201
Evaporative condensers	1,174	1,301,117	1,106	1,228,387	68	72,730	1,210	1,231,184	1,091	1,105,351	119	125,833
Unit coolers	47,579	4,670,426	46,566	4,546,427	1,013	123,999	48,218	4,188,031	47,839	4,093,211	379	94,820
Air conditioning	1,963	1,022,304	1,908	1,003,125	55	19,179	1,526	811,784	1,488	796,223	38	15,561
Refrigeration	45,616	3,648,122	44,658	3,543,302	958	104,820	46,692	3,376,247	46,351	3,296,988	341	79,259
Other heat exchanger equipment [3]	xxx	4,930,893	xxx	4,781,348	xxx	149,545	xxx	4,506,326	[r] xxx	4,398,778	xxx	107,548
SECTION II—SELF CONTAINED AIR CONDITIONING UNITS AND ABSORPTION SYSTEMS												
Self-contained air conditioning units	15,803	5,413,485	14,567	5,123,016	1,236	290,469	xxx	xxx	xxx	xxx	xxx	xxx
Store type	4,237	3,289,681	4,116	3,170,471	121	99,210	[r]4,925	[r]3,472,393	[r]4,722	[r]3,345,731	[r]203	[r]126,662
Room type	11,566	2,143,804	10,451	1,952,545	1,115	191,259	[4]	[4]	[4]	[4]	[4]	[4]
Miscellaneous air conditioning and refrigeration equipment, including absorption systems	xxx	1,290,766	xxx	1,263,831	xxx	26,935	xxx	916,151	xxx	911,264	xxx	4,887

NOTE: The symbol "xxx" denotes not applicable.
[r] Revised.
[1] Continental United States.
[2] Includes Canada, Mexico, and United States territories.
[3] Includes condensers and liquid coolers, shell and tube and shell and coil types, as well as fin coils (heating and cooling) and plate type evaporators.
[4] Data on shipments of room type air conditioning units revised as follows for first and second quarters combined: Total—6,759 units, $1,806,072; Domestic—6,346 units, $1,500,508, Export—413 units, $96,565.

TABLE II—AIR CONDITIONING EQUIPMENT AND COMPONENTS AND ACCESSORIES FOR AIR CONDITIONING AND COMMERCIAL REFRIGERATION EQUIPMENT: PURCHASES FOR INCORPORATION INTO COMPLETE UNITS OR FOR RESALE, SECOND AND THIRD QUARTERS 1946

Product	Third Quarter 1946 Purchases of Complete Units and Components				Second Quarter 1946 Purchases of Complete Units and Components			
	Complete Units (number)	Compressors or Compressor Units (number)	Condensers (number)	Total Purchase Value (dollars)	Complete Units (number)	Compressors or Compressor Units (number)	Condensers (number)	Total Purchase Value (dollars)
SECTION I—COMPONENTS AND ACCESSORIES								
TOTAL	xxx	xxx	xxx	776,748	xxx	xxx	xxx	904,492
Condensing Units	4,194	6,427	6,332	617,839	4,881	2,927	6,802	819,359
Ammonia refrigerants	22	—	—	21,248	—	—	—	—
Refrigerants except ammonia	4,172	6,427	6,332	596,591	4,881	2,927	6,802	819,359
Air cooled	3,519	5,934	5,837	394,524	4,276	2,597	6,465	636,473
Water cooled	653	493	495	202,067	605	330	337	182,886
Compressors and compressor units	227	xxx	xxx	21,255	59	xxx	xxx	23,979
Ammonia refrigerants	2	xxx	xxx	2,600	—	xxx	xxx	—
Refrigerants except ammonia	225	xxx	xxx	18,656	59	xxx	xxx	23,979
Centrifugal refrigeration machines	—	—	—	—	—	—	—	—
Heat exchanger equipment	xxx	xxx	xxx	137,654	xxx	xxx	xxx	151,154
Evaporative condensers	45	xxx	xxx	53,643	55	xxx	xxx	63,921
Unit coolers	121	xxx	xxx	68,226	181	xxx	xxx	68,906
Air conditioning	3	xxx	xxx	888	3	xxx	xxx	874
Refrigeration	118	xxx	xxx	67,338	178	xxx	xxx	68,032
Other heat exchanger equipment [1]	xxx	xxx	xxx	15,785	xxx	xxx	xxx	18,327
SECTION II—SELF CONTAINED AIR CONDITIONING UNITS AND ABSORPTION SYSTEMS								
Self-contained air conditioning units	—	1,090	1,163	65,396	xxx	xxx	xxx	xxx
Store type	—	50	—	11,954	—	44	100	25,585
Room type	—	1,040	1,163	53,442	[2]	[2]	[2]	[2]
Miscellaneous air conditioning and refrigeration systems, including absorption systems	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx

NOTE: The symbol "—" denotes zero. The symbol "xxx" denotes not applicable.
[1] Includes condensers and liquid coolers of shell and tube and shell and coil types, as well as fin coils (heating and cooling) and plate type evaporators.
[2] Data on purchases of components for room type air conditioning units combined as follows for first and second quarters to avoid disclosure of operations of individual companies: Complete units, none; Compressor or compressor units, 1,560; Condensers, 521; Total dollar value, $65,818.

REWA Discusses Future Business Operations at Annual Convention

MEETING in their 12th annual convention in Chicago, March 19-22, The Refrigeration Equipment Wholesalers Association selected George J. Roche, Roche & Hull, Inc., Baltimore, Md., as president of the association for the coming year. Other officers include: Vice-president J. F. Wickham, Lincoln, Nebr.; Treasurer Alex H. Holcombe, Jr., Philadelphia, Pa.; Secretary R. L. Hinshaw, San Francisco, Calif. Board of Directors: Irving J. Fajans, New York City; J. P. Glass, Chicago, Ill.; H. W. Holt, Pittsburgh, Pa.; E. C. Marsden, Hartford, Conn.; H. R. McCombs, Denver, Colo.; J. M. Mideke, Oklahoma City, Okla.; Warren H. Parker, Greensboro, N. C.; J. D. Ross, Montreal. Immediate past president is Ted I. Glou, Syracuse, N. Y.

GEO. J. ROCHE

Thursday evening the association honored the past presidents at a cocktail and dinner party. The past presidents table included retiring President Glou and President-elect Roche. Each past president was identified by a placard at his place, indicating the year in which he served. H. W. Merkle, president 1938, and Harry Alter, president 1943, were absent. The other past presidents included: H. R. McCombs, 1945; H. W. Small, 1944; Alex H. Holcombe, Jr., 1942; C. E. Borden, 1941; F. S. Langsenkamp, Jr., 1940; Leo H. Gorton, 1939; R. H. Spangler, 1937; H. S. McCloud, 1936, and the present Executive Secretary.

President Glou, in formally opening the meeting on Friday morning, outlined the accomplishments the association recorded during the past year and commented especially on the work of the Trades Relation and the Manufacturers Relations Committees. In his report President Glou stated, "During the past few months publicity was given to the distribution of unitary equipment by wholesalers and considerable controversy regarding this ensued. Many inquiries to me regarding the association's position in the matter necessitated my clarifying the fact that the association's By-Laws did not prohibit the members from handling unitary equipment providing it is merchandised in accordance with the method of distribution outlined in the By-Laws and Constitution. It is the method of distribution that affects his membership status. Unitary equipment can be distributed by a member without jeopardizing his membership status provided he does not sell this equipment through franchised or exclusive dealers, or assume the responsibility of warranty."

Past president H. R. McCombs, Denver, discussed an important subject in "Will the Wholesalers' Inventories Become a Major Problem in 1947?" While Mr. McCombs' address had a cautionary tone to the wholesaler as regards cancellation of orders, he did state that it would be well to re-evaluate orders and re-schedule so that a more balanced amount would be received over a period of time. This is to avoid the receipt of an accumulation of large orders at one time.

Fred B. Wilson, in his paper on "Credits Will Bear Watching in 1947" pointed out that a turn in business conditions will bring about a more normal competitive situation and, accordingly, it is advisable for the wholesaler to be watchful of his and his customers' position.

George J. Roche, Chairman of REWA Manufacturers Relations Committee during the past year, outlined the activities engaged in, by his committee and among other things, stated that his committee had met with officials of Kinetic Chemicals, Inc., and had suggested a plan for speeding up cylinder return, which the company advised is of major importance if a free supply of "Freon" is to be had during the coming season.

In the afternoon session, Alex H. Holcombe, Jr. discussed "Cost Figures—Key to Profits in 1947." In his talk he outlined on the blackboard average percentage figures that he had worked out to emphasize the need of close control on business expenses in order to insure a stable business position when normal times arrive.

NEWS and ACTIVITIES

Announcements of the activities and educational work of the International Society and Local Chapters appear in this department.

California Ass'n Set for Big Convention and Exhibit

WITH the theme "Promotion Through Education," the California Ass'n of the Refrigeration Service Engineers Society is prepared to entertain an anticipated attendance of nearly 1000 service engineers for the three-day convention and exhibition, being held in the Long Beach Municipal Auditorium,

LONG BEACH, CALIF.
April 25, 26 and 27

The California Assn. invites all refrigeration men to attend the meeting and exhibits.

AUBURN, MAINE, APPLIES FOR CHARTER

A GROUP of men in the vicinity of Auburn, Maine, have to date held a series of four meetings designed to organize a chapter of the R.S.E.S. in that city. David J. Daris had been acting as chairman over the meetings until on February 11th permanent officers were elected. They are: David J. Daris, Auburn, *President;* Robert Harlow, Augusta, *1st Vice-President;* Edward Boudway, Portland, *2nd Vice-President;* Ralph A. Wagg, Auburn, *Secretary;* Vincent DeAngelis, Auburn, *Treasurer;* and Amos G. Smith, Lewiston, *Sergeant-at-Arms.* Directors—Fred E. Tucker, Clayton E. Canning, Ralph W. Lowe, Kenneth L. Willett, Philip L. Gervais, Robert LeBourdais and Donald R. Chase.

At the February 11th meeting, two speakers presented an interesting educational program. First, Charles R. Logan, Vice-President and Sales Manager of Elpeco, spoke on the relation of the serviceman to the refrigeration industry, pointing out their responsibility to the growth of the industry. The second speaker, M. J. Meiklejohn, New England Regional Manager of Elpeco, gave an instructive talk on moisture problems in the refrigerating system. He displayed various size driers explaining their construction, then described the action of various chemicals used as drying agents. A new DFN moisture indicator was demonstrated and the usual question and answer period wound up the program.

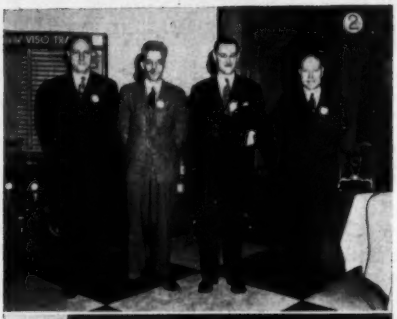
Arrangements have been made for a dinner meeting in April, at which time the charter will be presented. The chapter is to be known as Dirigo Chapter. Twenty-eight new members were accepted during this meeting.

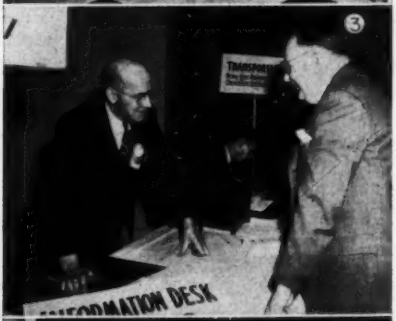
GREENVILLE FORMS CHAPTER

ON FEBRUARY 22nd, about 25 or 30 refrigeration men met in the Greenville city council chambers for the purpose of considering the formation of a chapter. Seventeen of the men signed applications for membership and an application for charter. The chapter will be known as Greenville Chapter. Messrs. Carnell, Vernon Petty and Henry Gallatt of Atlanta, Ga. were visitors and aided in the formation of the chapter.

W. C. Lindley was elected temporary President, V. W. Swan, 1st Vice-President, William E. Williams, 2nd Vice-President, and Warren N. King, Secretary and Treasurer.

8th Annual Interprovincial RSES Meeting Reports Annual Progress





REPORTING continued progress in both membership and finances, the Interprovincial Association of the Refrigeration Service Engineers Society, comprising eight Canadian chapters and members at large, met for the 8th annual conference in Montreal, March 16 and 17, at the Mount Royal Hotel.

Mount Royal Chapter, as host to the convention, provided a pre-convention buffet supper and entertainment on Saturday evening. The annual banquet, under the sponsorship of the Mount Royal Chapter, was held on Monday evening in the Normandie Room of the hotel.

In formally opening the convention on Sunday morning, President Gordon Roe outlined the progress that the Association had made during the year, and expressed his appreciation for the splendid work accomplished by the various officers and committee chairmen. The excellent reports of Secretary E. G. McCracken and Treasurer Gordon Condie substantiated the membership and financial gains which the Interprovincial Association accomplished. The Association reported the purchase of a sound motion picture projector which will be circulated to the chapters with appropriate films for local chapter educational programs.

International officers introduced included Vice-President W. H. Marshall, Toronto;

1—The speakers' table at the Commercial members luncheon of the IPA. The speaker was George F. Taubeneck. 2—Four of the IPA officers. Left to right: W. W. Maybee, Windsor, Sergeant-at-Arms; M. W. Turner, Montreal, 2nd Vice-President; A. J. Pike, St. John, N. B., President; A E. Doan, Toronto, Chairman, Educational Committee. 3—Treasurer Gordon Condie, Toronto, greets International Secretary H. T. McDermott at IPA convention. 4—Registrants line up early to register for IPA convention.

Director Nap. Brossoit, Montreal; G. E. Graff, Columbus, Ohio, Chairman of the International Educational Fund Committee; and Willis Stafford, Chicago, Chairman of the International Publicity Committee. International Secretary H. T. McDermott responded on behalf of the International Association and complimented the Interprovincial Association on the progress reported.

The educational program of the convention got under way on Sunday afternoon with W. Podd presiding as chairman. Frank Y. Carter, Engineer, Detroit Lubricator Co., Detroit, discussed the expansion valve—its various types, designs and application. Following his talk, N. M. Dunning, Superior Valve & Fittings Co., Pittsburgh, Pa., delivered an address on the history and development of the low pressure refrigeration unit.

I.P.A. OFFICERS 1947-1948

President, A. J. Pike, St. John, N. B.
1st Vice-president, A. G. Olmstead, Hamilton
2nd Vice-president, M. J. Turner, Montreal.
Treasurer, Gordon Condie, Toronto.
Secretary, E. G. McCracken, Toronto.
Sergeant-at-Arms, W. M. Maybee, Windsor.
Educational Director A. E. Doan, Toronto.

Board of Directors

Nova Scotia: W. G. Rowe, Halifax; A. Mullenger, Halifax.
New Brunswick: N. Tait, St. John; A. La Flamme, St. John.
Montreal: D. S. Greenberg; N. Brossoit.
Ottawa: W. Lowry; W. Podd
Toronto: C. G. Heilig; D. Fowler.
Winnipeg: J. Gibson; F. Whalley.
Calgary: H. R. Dickieson; W. H. Dowling.
Members-at-Large: W. Hamilton; A. G. Small, Vancouver.

Concluding the afternoon educational session, H. S. Parish, Toronto, conducted a silver dollar quiz in which the participants were awarded monetary prizes if they were successful in answering selected questions.

On Monday, the educational session was opened by an interesting film on "The Principles of Electricity" presented by R. McBrien of the Canadian General Electric Company. This colored film illustrated visually the principles of electricity and proved of considerable interest to the group.

R. L. Williams, Kinetic Chemicals Co., Wilmington, Del., in discussing the development of the "Freon" group of refrigerants and the field covered by each, stated that at present approximately 225 million pounds of "Freon" refrigerants have been sold and used. He pointed out that chemists are constantly at work in developing better quality control, as well as new refrigerants, and he stated that two new members of the "Freon" family—numbers 13 and 14—had been produced in small quantities, and that while the cost of production was in the neighborhood of $1,500 per pound for these refrigerants, a limited amount had been placed at the disposal of several manufacturers for field testing at an approximate cost of $6.00 per pound. "Freon-13," he advised, has a boiling point of —115 degrees, and "Freon-14" a boiling point of —198 degrees.

Following Mr. Williams' interesting discussion and just prior to the luncheon, Vice-president A. J. Pike requested the report of the Nominating Committee which was presented by Chairman Tom Savill, Windsor, and the Committee's report was unanimously accepted and the officers elected as presented.

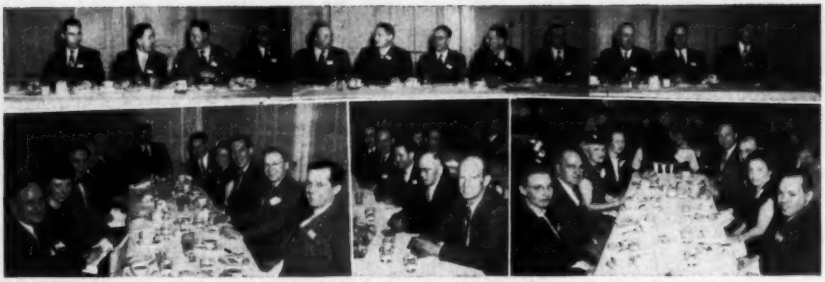
In following out the usual custom of the Interprovincial Association, a commercial members' luncheon was held with an address by George F. Taubeneck, Detroit. In his usual dynamic manner Mr. Taubeneck discussed current international conditions.

Reconvening for the afternoon educational session, the first demonstration was conducted by E. Robson, Frigidaire Products of Canada, Ltd., Leaside, Ont., who with the aid of a glass evaporator described the refrigeration cycle as seen through glass.

J. W. Krall, Tyler Fixture Corp., Niles, Michigan, pointed out in his talk on frozen food cabinets, that the home freezer of tomorrow would undoubtedly contain a substantial amount of pre-cooked frozen foods, thus lightening the work of the home-maker. It was Mr. Krall's opinion that the home freezer would find a very definite place in the home as an adjunct to the domestic refrigerator.

In a clever demonstration with the use of cut-outs, Howard Pratt, Servel Canada, Ltd., explained the construction and operation of the Servel absorption unit. His method of presentation simplified the understanding of the operation and construction of the unit.

Concluding the educational program, H. S. Parish presided at the "Information Please" session, and with a Board of Experts consisting of R. L. Williams, E. Robson and G. E. Graff, questions were answered from the floor.



Views of the Iowa State Association annual banquet. Officers and distinguished visitors appear at the speakers table. *(Photos by Irving Alter)*

IOWA STATE ASSOCIATION FORMED

PRELIMINARY registration for the first annual Iowa Association RSES meeting started Friday afternoon, March 7, 1947, with over fifty refrigeration service engineers, manufacturers and jobbers registered by evening. Various groups gathered to discuss the business to be transacted at the Saturday and Sunday meetings. Erwin Meyer, temporary chairman, was in evidence throughout the afternoon and evening, checking on the final details with his committee.

The Saturday morning session opened with a brief outline of the formation movement by Mr. Meyer. He recalled the first meeting held in August, 1945, which was not followed up, and in July, 1946, another meeting was scheduled to which Willis Stafford of the Herman Goldberg Company was invited. Following the plans laid down at that meeting, enough interest was shown by the several State Chapters. A petition for charter was presented to the International Society and arrangements were completed for the meeting. After these opening remarks, Mr. Meyer had the appointed secretary read the proposed Constitution and By-Laws and asked for discussion on each section as read. With a few minor changes the Constitution and By-Laws were adopted.

The following officers were elected for the year: Erwin F. Meyer, Davenport, *President;* Ray Jones, Cedar Rapids, *1st Vice-President;* H. G. Brewster, Des Moines, *2nd Vice-President;* Richard M. Herbert, Waterloo, *Secretary-Treasurer;* Wm. Hogan, Burlington, *Sergeant-at-Arms.*

Following the election of officers, Willis Stafford, International Director of Publicity, presented a very fine and instructive talk on the "Aims of a State Association." He outlined the overall structure of the RSES and pointed out how the State Association, through its officers and committees, can help the International Society by aiding the State Chapters affiliated with the Association.

The next feature on the program was a discussion and motion picture on "Shop Layout and Procedure" by Ray Kruse, Kruse Refrigeration, Woodstock, Ill. Mr. Kruse started in his basement, as many others have done, then he transferred his shop to his garage and finally sound business practice and continual growth demanded a complete building. Mr. Kruse pointed out that since going into his modern shop and salesroom, his gross income has been well into five figures and he feels the need for additional space already.

Many of the operations involved in complete rebuilding of both hermetics and open types were explained to a very interested audience.

Continuing with the educational program, A. J. McCoy, Sales Engineer for the Alco Valve Company, briefly discussed the various types of suction line controls. Mr. McCoy pointed out the possibility of improper design of the system being at fault. In such cases the use of suction line controls will not be entirely satisfactory.

The banquet and installation of officers was attended by 194 people. Many of the service engineers enjoyed the company of their wives at the banquet and dance.

Archie Fait, past president of Illinois Association, Lincoln, Ill., acted as master of ceremonies and introduced those at the speakers' table from out of the state. While dinner was being served, a trio furnished appropriate music.

The impressive ceremony of obligating the officers and presenting the charter was conducted by Willis Stafford of the Herman

Only

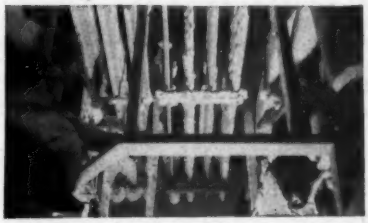
KOLD-HOLD PLATES

give you

100% PRIME SURFACE

The reason for Kold-Hold superiority in evaporator type plates, plate banks, stands and cabinet liners is simple. PRACTICALLY EVERY SQUARE INCH OF EXPOSED PLATE AREA IS PRIME COOLING SURFACE. Refrigerant is in contact with the back side of all exposed surfaces. The result is greater cooling capacity per square inch . . . lower temperatures with less plate area . . . faster freezing with smaller equipment. And because Kold-Hold Plates have a higher coefficient of heat absorption, greater economies in both installation and operation can be had by using smaller plates and a smaller compressor.

For your next "lowside" application get the facts on Kold-Hold. Kold-Hold Jobbers are always available to help you.



INSTALLATION PROVES KOLD-HOLD SUPERIORITY

Above installation is a small combination sharp freeze and storage room. The Kold-Hold bank was installed when it was found that plates of another type were incapable of holding the proper temperature. Between seven and eight tons of food are stored at —20° and approximately 1800 pounds of turkeys are frozen every twenty-four hours. Installing contractor states: *"Kold-Hold plates defrost in less than one-third the time required for other plates in the same circuit."* This proves Kold-Hold's exclusive design makes possible much higher rate of heat transfer.

KOLD-HOLD

Jobbers in Principal Cities

PROCESSING TRANSPORTATION STORAGE

protects every step of the way

KOLD-HOLD MANUFACTURING CO., 502 E. Hazel St., Lansing 4, Michigan

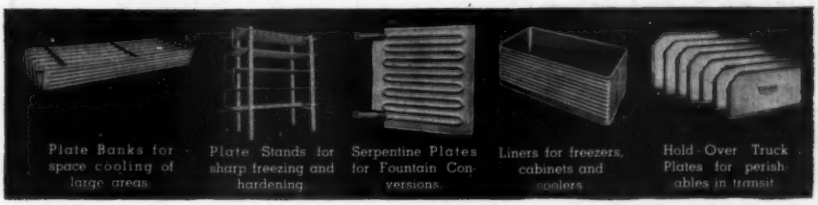


Plate Banks for space cooling of large areas.

Plate Stands for sharp freezing and hardening.

Serpentine Plates for Fountain Conversions.

Liners for freezers, cabinets and coolers.

Hold-Over Truck Plates for perishables in transit.

Goldberg Co., Chicago. Through the very fine assistance and careful plans of Wm. Hogan, Sergeant-at-Arms, the officers were introduced to the entire group and each was then obligated.

Sunday morning found 45 interested members and guests at the opening question period conducted by Paul Reed, International Education Chairman; Dick Hendrickson, Advertising Manager, The Refrigeration Service Engineer; and Frank Carter, Engineer, Detroit Lubricator Company. Mr. Carter was introduced and proceeded to discuss the low temperature type of thermostatic expansion valves. He showed the various types of low temperature systems and the reason special designed expansion valves are required. His talk was well illustrated with slides covering each phase of the discussion. A question period followed.

The final educational topic was presented by Paul Reed, who covered the subject of "Oil and Refrigerant Mixtures" by the use of charts showing the amount of refrigerant oil will contain at different pressures and temperatures. He discussed and illustrated the several ways of separating the oil from the refrigerant, both on the low and high side of the system.

The closing order of business was the reading of resolutions of thanks to the men who had worked diligently to make this first annual convention a success and for the splendid cooperation of both manufacturers and jobbers. Another resolution was passed to the effect that the Iowa Association petition the International Society for representation on the International Board.

WISCONSIN STATE HAS SUCCESSFUL MEETING

THE annual meeting of the Wisconsin State Association, held in the Pfister Hotel, Milwaukee, March 15-16, was attended by a good representative crowd of the refrigeration men in the state. It was highlighted by three outstanding educational papers on the educational program and by a most enjoyable banquet during the evening of the first day.

The convention got under way Friday evening with early registrations and an informal get-together, during which a discussion on general service problems occupied the evening. On Saturday morning the official call to order was made by A. L. Robertson, President of the State Association. A Nominating, Auditing and Resolutions Committee were appointed, then the balance of the morning was occupied with a Question and Answer session conducted by Paul Reed, Director of the International Educational and Examining Board, and assisted by Dr. W. O. Walker, Ansul Chemical Co., C. W. Stoner, Ben Hur Manufacturing Co., Del Albright, Automatic Products Co., and C. Kuhn of Cutler-Hammer, Inc.

The first speaker on the educational program during the afternoon session was C. W. Stoner of Ben Hur Manufacturing Co. He spoke on the subject "Fact vs. Theory in the Design of Freezers." Mr. Stoner provided some very useful information in the design, construction and testing of freezer cabinets. He related some of the more interesting test results obtained by his company on a freezer they manufacture.

The next speaker was Dr. W. O. Walker, Ansul Chemical Co., Marinette, Wis., on the subject "Moisture and Drying Methods." As usual, in meetings of servicemen, this proved to be one of the most interesting subjects of the day. Dr. Walker covered the subject from the sources of moisture in the refrigerating system, its effect on the system, the effects of various refrigerants, the results of tests made by his laboratory, methods employed in drying a system, and material to use for drying. The question period following Dr. Walker's talk occupied so much time that adjournment followed almost immediately.

The annual banquet held Saturday evening featured Herman Goldberg as the after dinner speaker, then the room was cleared for dancing which continued to a late hour in the morning.

The Sunday morning session opened with a question period, with Paul Reed and his Board of Advisors answering the questions. Next on the program was Paul Reed speaking on the subject "The Evaporative Condenser." Mr. Reed outlined the various developments in condensers and provided a thorough discussion on the need of these devices in the conserving of water. He described water saving devices as a whole, including the ordinary spray pond, the cooling tower, the forced draft towers and various designs of evaporative condensers. His talk was illustrated with slides.

During the business session of the Sunday meeting, G. D. Wang was appointed as Chairman of the Standards Committee, spe-

THERMOSTATIC EXPANSION VALVE **TXV** **TESTER**

Another Revolutionary testing instrument by AIRSERCO—makers of the famous Thermostatic Control Tester.

Another AIRSERCO short-cut for the Service Engineer—a time-saver and money-maker that tests and sets the super-heat requirements for all types of thermostatic expansion valves.

- **INDICATES** by gauge readings the actual super-heat setting of the valve being tested.
- **EXAMINES** the true performance of the thermo valve by taking it in and out of its operating range.
- **ENABLES** the service engineer to quickly set any thermo valve for any refrigerant.
- **DETERMINES** holding adjustment and condition of the power element.

Also an ideal shop and service instrument for testing AUTOMATIC expansion valves and Thermo Controls

Available for Immediate Delivery
Write for Descriptive Literature

AIRSERCO

Short Cuts for the Service Engineer

MANUFACTURING CO., INC.
435 MELWOOD ST. PITTSBURGH 13, PA.

cialising on standard nomenclature for use in advertising. Lee Miles was elected as state delegate to the next national convention to represent members at large through their proxy. An invitation was received from the city of Fond du Lac to hold the next convention there.

Newly elected officers for the Association were installed and immediately took over their duties. They are: W. C. Bullis, Racine, *President;* Gaylord Randall, Rice Lake, *Vice-President;* H. S. Sargent, LaCrosse, *Secretary;* Richard Plansky, Thorpe, *Treasurer;* and Jack Coates, Rhinelander, *Sergeant-at-Arms.*

EDUCATIONAL FUND COMMITTEE

MEMBERS of the Educational Fund Committee of the Refrigeration Service Engineers Society, recently appointed by President W. W. Allison, include A. L. Fait, Lincoln, Ill.; G. E. Graff, Columbus, Ohio, Chairman; A. M. Palen, Minneapolis, Minn.

Above are the three members of the Educational Fund Committee. They are left to right: A. L. Fait, G. E. Graff and A. M. Palen.

The committee is to devise ways and means of securing sufficient financing to expand the educational program. Their recommendations are submitted to the Board of Directors for final action.

The studious appearance of these Madison chapter members, taking their examination for certificate membership is typical of the attitude of all members to this elevation in their membership classification.

REFRIGERATION SERVICE IN THE GOOD OLD DAYS

IN A recent R.S.E.S. meeting in Columbus, Ohio, Mr. George Schuld, Cleveland, Ohio, reminisced on the early days of refrigeration service, giving some ideas of the difficulties encountered at that time due to the lack of information available and a source of repair parts. In part his talk included the following:

GEORGE SCHULD

"Our speaker from Chrysler Airtemp Corporation has just told you about two stage units which we might call the airplane age in refrigeration. My talk, however, will take you back to the horse and buggy days when we had no such things as anemometers, salometers and other precision instruments with which to work. My first experience with refrigeration was with an ammonia six ton Arctic machine in about the year 1910. My first job was with a beer and soft drink bottling company, where we made our own CO_2 for bottling purposes, using marble dust and sulphuric acid. That was a good many years ago. We filled bottles with every kind of cork imaginable, including the old Hutcheson pop bottle where the cork had to be pushed inside to open the bottle.

"Those days we did not punch clocks nor did we listen for the whistle to blow. We worked until we were finished, regardless of the length of time. One hundred hours in six days was not unusual, after which we would often volunteer to work on Sunday and put in a little more time.

"Breakage in the bottling business was quite high due to the high pressures of the CO_2 we had to work with. We were cut and sewed quite frequently, and the anesthetic was just plain whiskey. Pressures ranged from 60 lbs. in bottles to 250 lbs. for filling soda tanks, and they often let go. The coming of the six ton Arctic was quite a large improvement. The compressor stood in one room, the motor in another, with a 60 ft. belt to drive it, which was about six times more than needed. We had a dairy aerator over which we passed water to cool to 40 degrees. The water was then carbonated before going to the filling machine. This allowed us to fill bottles at from 12 to 15

"MAKE MINE THE GAUGE WITH THE RECALIBRATOR"...

That's the final verdict of refrigeration men who know their gauges and dial thermometers. They look upon the Marsh "Recalibrator" as a feature that makes a better instrument still better.

There is a good, solid reason for this: Every refrigeration man knows how difficult it is to avoid knocking gauges out of adjustment, particularly test gauges that receive rough handling in the tool kit and on the job. But when this happens to a Marsh gauge, you simply turn the "Recalibrator" screw as illustrated until the pointer coincides with zero. This, remember, is not merely re-setting of the pointer, for the "Recalibrator" is designed to actually re-establish the relationship between the bourdon tube and the movement. Thus it corrects the gauge at all points on the dial—the only basically sound way to do it.

Yes, it's reassuring to use these instruments that are so easy to keep on the beam. All are available with the "Recalibrator". Ask for handy booklet covering gauges and thermometers for refrigeration service.

JAS. P. MARSH CORP., 2057 Southport Ave., Chicago 14, Ill.
***Export Department:* 155 East 44th St., New York 17, N. Y.**

Marsh Refrigeration Gauge —made in pressure, compound, and ammonia types.

Marsh Serviceman—remote reading service thermometer —now available in range —30°F. to +65°F. for work on quick-freeze units.

MARSH *Refrigeration Instruments*

lbs. pressure with much less breakage, cold water naturally absorbing more CO_2. In our work at that time we had an improved gas mask—a wet sponge tied over the mouth which was guaranteed to allow purging to the hearts content. Every valve on the old six ton Arctic was tagged and numbered so we would know how to start the machine and how to shut it off. We had no R.S.E.S. members at that time to whom we could turn to for advice.

"Then came the low pressure machine which was really the last word. Engineers came out to show us how to service these machines, but they themselves knew nothing about them. The refrigerant, of course, was SO_2 and the systems mostly of the flooded type. The oil used was like liver when it got in the cold coil in ice cream cabinets and our troubles were endless. When going on service calls on the old Nizer cabinets, it was usual practice to load up with 15 or 20 dozen brushes for the motors they used, and one Frigidaire man, I recall, carried a piece of 2 x 4 about 6 ft. long which he used to jar the cabinets, thus breaking loose the oil blanket in the coil.

Then Came the Ebulator

"I will always remember the improvisions we made, which were crude but served the purpose. One of these was the practice of dropping solder on the float valve to lower its level in the oil, or when we had too much we took some of the solder off again until we got it at the right level. We used to throw a box or two of carpet tacks in the flooded ice cream cabinet coils to break up the oil. Then later on Kelvinator came out with a long bunch of wires with notches in them, which they called "ebulators"—a new word to the industry. We had to put one of these ebulators in each tube after removing the float. When our hand was warm we got it in the opening OK, but when it got cold and stiff, we had a hell of a time getting it back out.

"The gas mask we wore in those days prevented SO_2 from getting in our lungs, but also prevented air from getting in. If at any time we got a good gassing of SO_2 we were well supplied with aromatic spirits of ammonia and buttermilk, and often went home smelling like burnt matches. There was much we did not know about SO_2 and few sources of information from which we could learn. I recall one Frigidaire man working on a B-15 reach-in box with one of the old dome compressors attached. He was purging in a bucket of lye water but purging from the suction service valve. Of course his water rapidly disappeared, much to the puzzlement of the Frigidaire man. I suggested to him that he could not do that, but he replied 'There was pressure on the low side because when I loosened it, it went sh sh sh.' I said, 'Brother, that did not go sh sh sh, it went hs hs hs.' Of course the compressor stuck tight.

10th Annual R.S.E.S. Convention to Be Held in Cleveland, January 21-24, 1948

The Board of Directors of the Refrigeration Service Engineers Society, by majority action, announce after due consideration, based on the recommendations of a poll of the chapters, that the 10th annual convention of the Society will be held in Cleveland, January 21-24, 1948, just in advance of the All-Industry Refrigeration and Air Conditioning Exposition January 26-29, 1948.

"The early ice cream days were fun. Servicemen had to be detectives as well as mechanics. Ice cream companies furnished the cabinets, paid electric bills and furnished service free in return for the handling of their products. We had separate meters on the cabinets and many customers endeavored to use our current for other purposes. One of our efforts in detective work used the idea of two match sticks inserted behind the switch knife of the Square D switch. If those match sticks were at the bottom of the box in the morning, we knew that guy was a liar. He had pulled that switch to make his own connections. In later years we experienced the wonders of the soda fountain, no two of which were alike because each manufacturer had his own individual ideas. Many of the improvements were made by servicemen.

"Most of our knowledge was gained the hard way. For example, I recall bringing home an SO_2 model N sump tank which was leaking. I worked out of my home at that time and I put the tank in the back yard. I had an Italian neighbor who made quite a hobby of his garden of vegetables, and since this was in the hot summer months, the garden was at its peak. The heat overnight created pressure in the tank and all the gas leaked out. In the morning my lawn looked pretty yellow and so was my neighbor's garden. When I saw him that morning he said, 'Mr. Schuld, there must have been a frost last night.'"

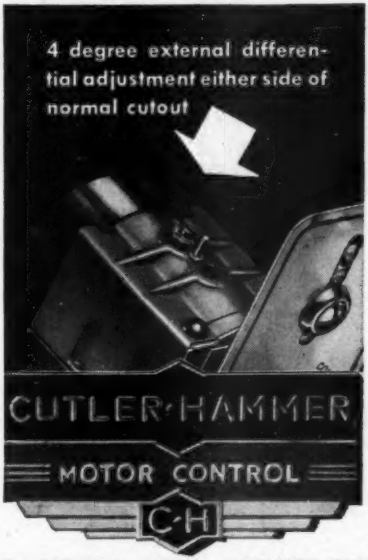
A COMPREHENSIVE LINE

Cutler-Hammer Refrigeration Replacement Control

The Cutler-Hammer line of Refrigeration Replacement Control is unusually comprehensive and complete. One unit alone, the *Universal* unit, will handle 60% of the repairman's needs. In rare cases where exact replacement control must be furnished, that item also will be found in the Cutler-Hammer line, individually packed, clearly labelled, complete with dial plate, mounting screws, trim washers and instructions for mounting, and range and differential adjustments.

The Cutler-Hammer Line of Refrigeration Replacement Controls is the product of more than 50 years of fundamental control specialization . . . another reason why outstanding refrigeration wholesalers recommend it and alert service organizations from coast to coast feature and use it. . . .

CUTLER-HAMMER, Inc., 1363 St. Paul Ave., Milwaukee 1, Wis.



This One Universal unit alone covers 60% of all needs.

Bul. 9521N9

Adjustable Mounting Brackets
Maximum Mounting Centers....4-3/16
Minimum Mounting Centers....2-3/16

Adjustable Cutout Feature—Differential can be increased 4 degrees by turning indicator in "HI" direction and decreased 4 degrees by turning in "Lo" direction.

Adjustable Range—Turning screw clockwise lowers settings and counter-clockwise raises settings.

Operating knob can be adjusted to meet various evaporator scale settings. New knob is ideal for varying shield thicknesses. Makes *this* control adaptable to wider range of single dial replacement jobs where overload is not required in unit.

DOMESTIC, SEMI-COMMERCIAL AND COMMERCIAL CONTROL

Members, guests and their ladies get together for a festive evening at the banquet of Central Connecticut Chapter which was held on February 17, at the Hotel Bond grand ballroom, Hartford, Conn. More than 176 were in attendance at the affair.

Chapter Notes

• ATLANTA CHAPTER, *Atlanta, Ga., Jan. 31*—The meeting was preceded by a chicken dinner enjoyed by 20 of the members. President Ed. Rawls called the meeting to order and following a short business session, Mr. Cofer, Field Service Engineer of Frigidaire Sales Corp., presented a film entitled "Seven Simple Steps on Commercial Refrigeration." W. A. Edwards of Detroit Lubricator Co. extended an invitation to the members to visit the Georgian Terrace Hotel where service aid meetings, sponsored by Detroit dealers, would be held.

• CALGARY CHAPTER, *Calgary, Alberta, Can., Feb. 28*—The meeting was held in the Herald board room, with President Wm. Dowling presiding. This was intended as the installation of officers night, but due to the fact that all the officers were not present, the installation was postponed until the next meeting. President Dowling appointed a committee to meet with the Industrial Relations officer and help in the formation of an Alberta Apprenticeship Act. Those serving on the committee are D. Patterson, Chairman, B. McLean, M. Shepherd, A. Fisher, G. Grasdal, G. S. Slinn, C. F. Kloepfer.

The new officers to be installed at the next meeting are: W. H. Dowling, *President;* E. McKenzie, *Secretary,* C. F. Kloepfer, *1st Vice-President;* E. W. Howes, *2nd Vice-President;* E. J. Gush, *Treasurer;* H. E. Turner, *Sergeant-at-Arms.* Board of Directors—J. E. Palmer, I. E. Jones, R. S. Fisher, E. R. Kemp and C. D. Backstrom.

• CENTRAL ARIZONA CHAPTER, *Phoenix, Ariz., Feb. 17*—The meeting was honored with a visit from International President W. W. Allison, who gave an interesting talk on the history and objects of the Society, emphasizing the fact that it is strictly an educational and social activity society. Nine new members were received during the evening. They are D. M. Browning, I. D. Bishop, Joe W. Clark, Clarence H. Mills, M. B. Barlow, Robert G. Chapman, Kee Rash, Frank Mundy and V. M. Shaw.

• CENTRAL CONNECTICUT CHAPTER, *Hartford, Conn., Feb. 17*—The sixth annual banquet was held on this date at the Hotel Bond Grand Ball Room, with 176 in attendance. After a fine dinner, President Frank H. Tarela delivered a welcoming address and presented the chapter's newly elected officers. Charles E. Harris, International Vice-President was called upon and spoke briefly, followed by Wm. E. Tierney, President of the New England States Chapter. Visiting members included delegates from New Haven, Waterbury, Fairfield, Springfield, Worcester and Boston Chapters.

• CENTRAL NEW YORK CHAPTER, *Syracuse, N. Y., Jan. 14*—The annual election of officers was held on this date with the following results: C. L. Bailey, *President;* Harrison W. Capron, *Vice-President;* Richard A. Alletzhauser, *Secretary-Treasurer;* and Hollis Todd, *Sergeant-at-Arms.*

"I like its easy accessibility."

Refrigeration engineers who have examined and watched the performance of the new Mills Direct Drive Compressor tell us—enthusiastically—that it is exceptionally easy to maintain and repair. This is because, as our own engineers believed when they designed it, each assembly and each part are readily accessible.

Small and compact though it is, the Direct Drive has all of the service advantages of open type units. No larger than comparably rated hermetic compressors, it has no enclosing hood to make factory repair essential. Instead, it can be put back into operation "on location."

Its light weight, small size, and high standards of efficiency and performance are other factors contributing to its growing acceptance throughout the industry.

MILLS
Direct Drive
COMPRESSOR

First post-war addition to a distinguished family of air- and water-cooled condensing units

MILLS INDUSTRIES, INCORPORATED • 4100 FULLERTON AVENUE • CHICAGO 39, ILLINOIS

The above views were taken at the annual banquet, Cow Town Chapter, held January 15, 1947, at Welch & West Restaurant, for members and their families. A good attendance and a good time was had by all.

On February 11, when newly elected President C. L. Bailey took over the meeting he appointed R. D. Hursh and H. Capron as new Membership Committee. R. H. Wilson and R. D. Hursh were appointed as the Entertainment Committee.

• CHICAGO CHAPTER, *Chicago, Ill., March 11*—An unexpected visitor of the evening was R. L. Tucker of Alabama, who gave a very interesting demonstration of a hermetic unit analyser developed by him. During the course of his talk he gave the members some very useful pointers on servicing hermetic units and ways in which the analyser would be helpful. One of its useful purposes is that of breaking loose stuck compressors by reversing the motor and rocking the compressor back and forth until it can again be started. Bill Kramer of Minneapolis Honeywell Co., gave an interesting talk illustrated with three films which were produced in cooperation with the Army Air Corps on the subject of electronics. Carl Boettger won the door prize.

• CORN BELT CHAPTER, *Bloomington, Ill., Mar. 12*—A number of committees were appointed during the business session of the evening, and Gordon Eubanks gave a report on the meeting held in Springfield. Some discussion arose on the International Society's proposal to compile an all-makes perpetual service manual, and the members went on record as being in favor of it and being willing to pay additional dues to help support its production. Gordon Eubanks led a discussion on service problems during the educational program.

● DAYTON CHAPTER, *Dayton, Ohio, Feb. 13*—Art Wood of the Crosley Division, Aviation Corporation presented a rather lengthy discussion on the Crosley service policy. The discussion gave the group a brief glimpse into the problems of a large manufacturer. Mr. Smith, of the same company, followed with some interesting figures on refrigeration production and what the future holds for the serviceman.

At the February 27th meeting, Tenney Engineering Company provided the educational program which ended in a lengthy question and answer period.

The March 13th meeting was held at the Allied Supply Co. with 40 servicemen present. Mr. Fuller of Hubbell-Yoder Co. was a speaker of the evening and talked on the subject of cold plates, illustrating his talk with slides.

● ELM CITY CHAPTER, *New Haven, Conn., Mar. 7*—Three new members were admitted to the chapter during the business session, and Fred Montesanto was welcomed back after a long confinement in a hospital. Final plans were completed for the forthcoming annual dinner, and on the educational program Lee Wallace spoke on the subject "Air Conditioning." His talk was quite technical but thoroughly enjoyed. Entertaining movies climaxed the evening.

● FLORIDA WEST COAST CHAPTER, *Tampa, Fla., Feb. 13*—In the chapter's search for a new and permanent meeting place, W. A. Bingham, Sr. reported that the Tampa Radio Club was not acceptable. However, Mr. Fogarty informed Mr. Bingham that a new place would be available in approximately 30 days. Moving pictures and slides on "The Principles of Refrigeration" followed, and a general discussion was held.

● GOLDEN GATE CHAPTER, *San Francisco, Calif., Feb. 21*—In view of the fact that this was the first party for wives and children of the members, all business was suspended for the evening. The Social Chairman had planned a very special surprise party for the guests. The surprise of the evening was that the entertainment was supplied, not by professionals, but by everyone attending the party. Members staged a play based on the story of the life of George Washington. Each character made his costume of newspaper and acted out one incident of his life. After the play refreshments were served. The party was highly successful and everyone had a good time.

● HOUSTON CHAPTER, *Houston, Texas, Mar. 11*—This meeting was attended by a total of 53 men of the area, and after the usual business session, Messrs. Arley L. Baker, General Sales Manager, and Leo Freitas, representative of the Alco Valve Company, presented a talk on the construction and operation of the new Alco expansion valve known as the Thermal Limit Valve. They also explained the snap action valve designed for use in place of the usual solenoid valve and thermostat. To show the operation of the two devices, Mr. Baker employed a glass evaporator which permitted the expanding of gas from either top to bottom or bottom to top. Useful literature was passed out to the membership following the discussion.

● KANSAS CITY CHAPTER, *Kansas City, Mo., Jan. 15*—The installation of new officers for the year was made by retiring President A. M. Hoover, with Past President Merle Ferguson acting in the capacity of Sergeant-at-Arms. New officers installed were: Frank Brown, *President;* Cecil Visger, *1st Vice-President;* Robert Huston, *2nd Vice-President;* John Booi, *Secretary;* Albert Taylor, *Treasurer;* and Paul Shirley, *Sergeant-at-Arms.* Board of Directors—A. M. Hoover, M. L. Ferguson and F. C. Smith. The educational program included a General Electric film "Effects of Refrigerant in the Industrial World" and a film entitled "Tube Repair."

At the February 5th meeting, another G. E. film entitled "How G. E. Products are Made" occupied the first part of the educational program, followed by two of the International Society's educational films. I. C. McRoberts, Minneapolis-Honeywell Regulator Co., gave a short talk which was necessarily brief because of a lack of time. A question and answer contest was held, with Mr. Visger drawing the questions from a box and a Board of Experts providing the answers.

● KEY CITY CHAPTER, *Dubuque, Iowa, Feb. 5*—Mr. Larson of The Thermal Company was the first speaker of the evening, who talked on aids to the serviceman. He was followed by Mr. Utley of Dew Frost Frozen Foods, Inc., on the subject of processing and the temperatures maintained in frozen food cabinets. He supplied the membership with literature on the advantages of frozen food. The final feature of the evening was a movie on how to handle tubing, make joints, etc.

● MOTOR CITY CHAPTER, *Flint, Mich., Feb. 25*—After business for the evening was completed, a general discussion was held on various service problems in which everyone joined. It proved to be a very interesting session and lasted for quite some time. E. Hansen won the prize of the evening.

● ONTARIO MAPLE LEAF CHAPTER, *Toronto, Ont., Feb. 21*—Shortly after the meeting was opened it was turned over to the Chairman of the Educational Committee, A. E. Doan, who introduced the speaker, D. H. Bodine of Copeland Mfg. Co., Sidney, Ohio. Mr. Bodine presented a discussion on hermetic and semi-hermetic units. Two members of the audience aided in dismantling the units on display and re-assembling them.

● ORANGE COUNTY CHAPTER, *Orange Co., Calif., Jan. 16*—The meeting was preceded by a dinner and the meeting called to order immediately afterward. Fourteen guests were present for the evening, all of whom were introduced by the President. On the educational program, Merle Soden introduced the speaker of the evening, Richard R. Roehm, who spoke on the subject of manufacturing dry ice. Following this talk, one of the educational sound films entitled "Checking the Expansion Valve" was shown by Calvin Durango.

● PENINSULA CHAPTER, *Newport News, Va., Feb. 13*—E. E. Thompson of the Davison Chemical Company, gave a talk and demon-

stration on Silica Gel. The subject included the effects of moisture on the refrigerating system, methods of removal and steps to be taken in the prevention of the formation of corrosive acids in the system. He advised using Silica Gel dryers on the suction side of SO_2 systems to prevent moisture from entering the compressor.

At the March 3rd meeting, Messrs. Rubel and Kincash of Penn Electric Switch Company presented a lengthy discussion on the use and application of Penn controls. Mr. Kincash stated, "Industry will try to produce enough controls to supply the demand in the field. Inexperienced labor has been one of the difficulties in stepping up production." In discussing quality of new products, Mr. Kincash explained that shortages of high grade steel had held up deliveries, nevertheless workability will be standard as far as possible. He promised that new designs are forthcoming and will be on the market as soon as industry permits. His talk was followed by motion pictures showing the manufacture of Penn controls from beginning to end.

• ROCHESTER CHAPTER, *Rochester, N. Y., Feb. 12*—The educational program included a talk by Mr. Stevenson on the Apex, Stewart-Warner and Admiral refrigerators, with working models on which to demonstrate. It was a highly instructive talk and much enjoyed by the members. It was announced at the same time that a talk on Kelvinator would be provided for the next meeting. Refreshments were served by the Ladies Auxiliary.

• SACRAMENTO VALLEY CHAPTER, *Sacramento, Calif., Jan. 2*—A question and answer session occupied the educational program for the evening. Eugene Nystrom was the winner of a $20.00 prize, and Albert Reynolds the winner of a $1.75 prize.

At the February 6th meeting, Gerald Kennedy conducted a quiz session on the general subject of service problems of refrigerators. Gerald Kennedy was the winner of a door prize.

• SHREVEPORT CHAPTER, *Shreveport, La., Feb. 20*—T. L. Burroughs, International Director, presented the chapter with its charter. The meeting was preceded by a banquet and the presentation of the charter followed. There were 56 members in attendance and the chapter is apparently off to a very active start. All in all, the entire evening was a very enjoyable one.

• TOLEDO CHAPTER, *Toledo, Ohio, Jan. 8*—After the reports of the Secretary and Treasurer had been received, the newly elected officers were installed. They are: William Foster, *President;* John Harvath, *Vice-President;* Harold J. Dille, *Secretary;* Mark Dennis, *Treasurer;* and John Fuss, *Sergeant-at-Arms.* During the business session that followed the chapter voted to become a member of the Buckeye State Association.

• WESTERN MASSACHUSETTS CHAPTER, *Springfield, Mass., Feb. 11*—James Cargel introduced the speaker of the evening, Frank Haskell of Holyoke, who is a patent attorney and member of the chapter. Mr. Haskell talked on the patent procedure and gave the members some idea of the tricks of the game. He explained what would happen if a patent is copied, and in general kept the group thoroughly interested for quite some time.

At the February 25th meeting, R. S. Gove, Dayton Rubber Co., went over the history of the rubber industry and provided information on the manufacture of Dayton belts and the processing equipment used both in the manufacture of rubber and of belts.

LADIES AUXILIARY

• COLUMBUS, OHIO—Mrs. Robert J. Creamer, 1322 Wyandotte Road, Columbus 8, Ohio, was elected the Chairman of the Women's Committee for the Ohio State Association. She named the following on her committee: Mrs. O. B. Herrick, Cleveland; Mrs. K. P. Wall, Cincinnati; Mrs. R. E. Wagner, Piqua, and Mrs. R. R. Dunlop, Columbus. Mrs. Creamer and her Committee would appreciate any suggestions and help from any one in the Ohio State Association.

• KANSAS CITY AUXILIARY, *Kansas City, Mo., March 5*—The meeting took place in the home of Mr. and Mrs. Visger. The group voted to change the meeting place from the Bellerive Hotel to the I.O.O.F. hall, and the meeting night from the first Wednesday to the third Thursday in each month. The Auxiliary voted to present a check to the Red Cross. A gift box containing a pair of bird salt and pepper shakers and a hob-nail basket was given to Edna Visger for having completed five years without missing a business meeting.

AMMONIA COMPRESSORS

(Continued from page 36)

are used in the system and the bulb is not clamped tight or is in the wrong place or if dirt gets under the needle, not allowing the valve to close or using an improper sized thermo valve we will get liquid pumping. If a low pressure float is used and the float sticks open or dirt gets in the float, we might also get liquid pumping. In any event check the system for the cause, then correct the trouble.

From this brief discussion, it can readily be seen that ammonia compressors should be considered in the same light as a compressor designed for any other refrigerant. All compressors are pumps and perform the same duties and are serviced in a similar manner, regardless of the type of refrigerant used. There may be some slight changes of design or features, added to the unit to suit a given application such as the type of seal used, free area, lift of valves, etc. However, service problems remain essentially the same since the compressors perform similar duties and are subject to similar types of failure.

DISTRIBUTION THROUGH SERVICE

(Continued from page 40)

real test of performance. The service man has ideas for improvement of equipment and it can be said that much of product development is the result of the service department suggestions.

In many instances, dealers and independents employing service men have adopted the incentive plan whereby service personnel are awarded compensation on the sales of new parts and equipment.

There are, it is estimated, in excess of 30,000 service men—every one making a customer contact. What better ready-made sales organization is more readily available to secure a customer acceptance of refrigeration through service?

To further develop this valuable sales outlet, it should be borne in mind, first: that the service department should be fully informed of your entire sales program and the work of the service department should be definitely pointed in the direction of supplementing the sales activity; second: it should not be relegated to a subordinate position, but set up on an equal basis to cooperate with engineering and sales; third: the modern service man has long since learned that customer acceptance is not built by discrediting the sales department or the equipment, but recognizes his job of doing the necessary work to get the installation operating, satisfactorily for the customer, as quickly as possible.

Fourth: good service like any tangible commodity has a value. The public recognizes that indisputable fact. Therefore, the service department should stand on its own, and free service (if it can be called that) is of little value.

Yes, the service field has been busy in building customer good will and is ready to further the industry program of customer acceptance of refrigeration through better service.

MOISTURE AND DRYING METHODS

(Continued from page 46)

moved even if the drier did a complete job of moisture removal. Further, since the returning drier refrigerant would dilute the wet refrigerant, the feed liquid would become progressively drier and less and less water could be removed by the drier. Hence, under even these ideal conditions, considerably more than 6 hrs. would be required. In addition, moisture will tend to collect in the evaporator of a flooded system, because even in relatively small concentrations it vaporizes much less readily than the refrigerant.

Also, in either a flooded or dry type system, it is highly probable that at least part of the water will be dissolved or entrained in the oil entering the compressor and will take a long time to be carried over into the refrigerant cycle where it can be removed.

As a further consideration, it must be recognized that no drier will reduce the moisture content to zero even under ideal conditions, while under practical refrigeration conditions, the efficiency of the drier is apt to be considerably less than ideal.

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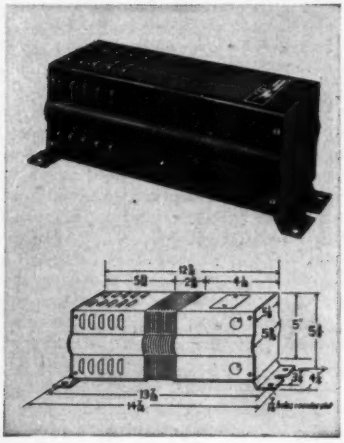
Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

Transformer

SOLA ELECTRIC COMPANY, Chicago, announces a new, low-cost constant voltage transformer designed to supply regulated voltage to domestic refrigerators and freezer units. It can be connected to any standard unit employing a compressor motor not larger than one-fifth horse power and proper operation of the box is insured even though line voltages vary as much as 30 percent from normal. It is designed with sufficient capacity to "pull-down" a 115V., one-fifth horse power motor-compressor unit from a temperature of 104F, even though the line voltage falls as low as 85V. After the initial pull-down period, safe operation is assured on voltages as low as 70V.



This new transformer is identical in design and construction to the standard Sola constant voltage transformer except for an extremely simple and rugged relay which operates only for a fraction of a second during each starting cycle. This new circuit arrangement prevents the current limiting characteristics of the constant voltage transformer from being effective until after the compressor-motor has reached its normal running speed. It also has made possible the small, compact dimensions of the transformer which permit its installation within the motor compartment of most standard types of refrigerators and freezers.

With this transformer the wide variation in line voltages which are prevalent in many areas, both urban and rural, can be instantly corrected, thus preventing burned-out motor windings, overheated motors and stalled compressors which are, in most cases, the direct result of abnormally high or low operating voltages.

Sola Bulletin CV-130 gives complete electrical and mechanical specifications and installation instructions.

Suction Check and Expansion Valve

AN ADVANCE in a refrigerant valve has just been announced by Tenney Engineering, Inc., 26 Avenue B, Newark 5, New Jersey.

The announcement states that this valve is a combination suction check valve and expansion valve in one unit, provided by incorporating in the Tenney TS-1 thermostatic expansion valve, a check valve which prevents back pressure and bleeding suction vapor from high temperature evaporator to low temperature evaporator when both are connected to one suction line.

This feature enables one compressor to service two or more evaporators without the hazard of temperatures becoming equalized in the evaporator during machine shutdown.

It is stated that the compactness of the unit permits application to installations in confined spaces. The check valve is effectively placed so that no increase in valve body size was necessary. Because of the simplicity of construction, the valve can be easily cleaned.

In effect, no installation is required, because the check valve is an integral part of the thermostatic valve assembly. In other words, when using this combination valve, installing the thermostatic expansion valve automatically provides a suction check valve. It may be placed in any angular position without interfering with its efficient operation and may be located where most conveniently accessible. It is stated that the use of this valve eliminates extra equipment in the line and fewer connections to make an installation.

A number of other features in addition to the check valve feature are claimed for this new valve. The thermostatic expansion valve itself has been so engineered as to overcome certain previously encountered expansion valve disadvantages.

The use of a feeler bulb is eliminated. The valve is not affected by box temperature, entering warm air, or warm suction lines. It responds instantaneously to changes in suction vapor conditions. There is no "hunting" due to the absence of any appreciable time lag in control, such as is usually encountered between suction line, bulb, control fluid, and valve diaphragm or bellows.

It is further claimed that, with the new Tenney check and expansion valve, extremely close super heat control (such as 5F. super heat with plus or minus ½F. for control) can be maintained in each unit of a group. It is particularly adaptable to modern evaporators with forced air, small tubes, short passes and distributor header combinations. It is also ideal for small evaporators or later type close coupled coil and machine combinations. The thermostatic valve will close completely above a definite evaporative pressure.

Another outstanding feature of the valve is its complete elimination of all need for choosing special "charges" and complicated "cross-charges" to assure operation in a specific temperature range. No special installation is required to prevent loss of control caused by condensing of bulb control fluid in valve body, as is needed with so-called "gas-charged" valves. The new Tenney valve has all the advantages of a "gas charged" and "liquid charged" valve, with none of the disadvantages of either.

With this new valve, the use of an external equalizer is unnecessary, as compensation for pressure drop in evaporator or distributor has been designed right into the valve itself. There's no sticking or binding as no stem packing is required.

Frosted Food Cabinet

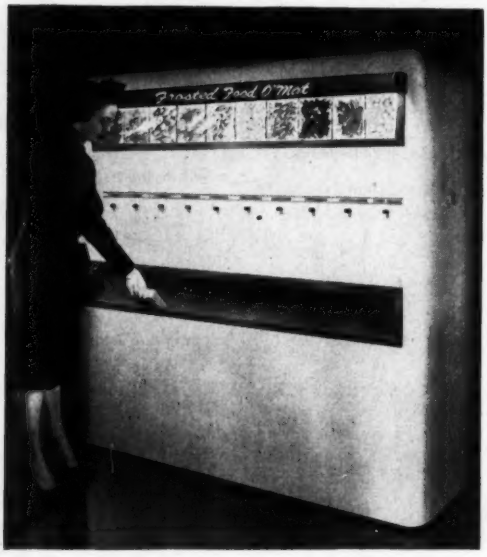
PRODUCTION of a new streamlined, self-service frosted food dispenser, which delivers a package at the touch of a button, is announced by the Frosted Food O'Mat, Inc., Pittsburgh, Pennsylvania.

Following two and a half years of research and development, the company reported it plans to commence distribution of the first units to franchised distributors within 60 days.

With engineering and design features new in the frosted food field, the cabinet has succeeded in reducing frosted food shopping to a simple operation. For the first time the shopper now looks at an attractive display case, scans a row of as many as 20 inviting frosted foods, lightly touches a button . . . and out drops a package.

The new dispenser, a gleaming white all steel constructed cabinet, combines new features of display, which will stimulate impulse buying, and offers ease of operation. Along the upper portion of the cabinet is the display section where fluorescent lighting sets off actual packages of frosted fruits and vegetables in eye-catching fashion. Below appear the names and prices. Each item has its delivery button which, when pressed, immediately delivers a package without the purchaser opening or tilting a door.

The new unit, designed for groceries, super markets, and food departments, will be manufactured in two models, for island or wall installation. With the display features and easy shopping operation now afforded, stores will be able to increase their volume of frosted food sales. The cabinet handles packages of practically all sizes and may be stocked with whatever brand or brands the merchant desires.



Coolers

NEW Circular and Square Unit Coolers just made available by Peerless of America, Inc., are getting a welcome and hearty reception from refrigeration men the country over it was announced by M. W. Knight, General Sales Manager of Peerless. The new units, of all non-ferrous construction, meet a universal need in the forced convection field, namely, a unit which is compact, yet capable of delivering the performance required to maintain temperature in walk-in and reach-in coolers.

Adaptability is a big feature of the new Peerless Models. The type "R" Circular Unit Cooler may be

installed on the wall or in a vertical position on the ceiling. It draws in air from all sides and the cooled air is diffused throughout the refrigerated space by means of the fan in the center of the unit. The fan motor is installed in an aluminum housing at the rear and not in the air stream.

One of the chief specifications given Peerless Engineers, for the design of the new forced convection units, was ease of installation. The removable air-flow drip pan permits quick access to the expansion valve which is within the aluminum housing on the circular models. The hanger and mounting arrangements on all models is based on the most simple mechanical principle. Less effort means less man-hours on installation costs.

The type "S" Square Unit Cooler is described by Peerless Engineers as a "little dynamo of refrigeration." It is particularly adapted to use in beverage coolers, back bars, direct draw beer coolers, display cases and small reach-in boxes.

The units are handsome in appearance with their bright finish aluminum casings. The unit has immediate buyer appeal "built-in" with its highly polished housing of aluminum. Copper tube and aluminum fin coil construction provides a maximum of evaporator efficiency. Hangers are aluminum.

Defrosting

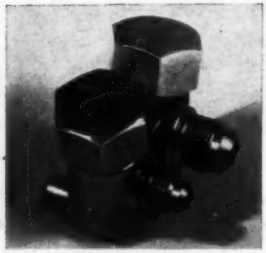
A RECENTLY developed electronic circuit for automatically controlling water defrosting of refrigeration coils, has been announced by the Bush Manufacturing Company, Hartford, Conn.

The new circuit employs a single 6SH7 tube to trigger a relay that initiates, automatically, all of the functions required for defrosting refrigerator coils with ordinary tap water. Called the Auto Defrost, this device is connected in series with the fan motor. It functions only when an accumulation of frost on the coil causes the fan motor to draw more current. By means of simple relay circuits, a single unit can control several refrigeration coils.

Advantages claimed for the Auto Defrost are its low price, its ease of installation on existing water defrost systems, and the fact that it works independently from the refrigeration system. Bush engineers state that many large commercial refrigeration plants are using the Auto Defrost and are experiencing new freedom from defrosting problems.

Manifold

THE Weatherhead Company announces the addition of a new two-valve manifold to its refrigeration line. This manifold combines the suction line valve and the



fluid line valve of a normal hermetic condensing unit into one compact, readily accessible fitting.

By using the regular service valve found in any hermetic service kit, one half of each valve assembly is eliminated. Further refinements in design and function simplify this manifold to five component parts, as compared to twenty-two in previous two valve systems. This results in a material saving in initial cost and weight.

The simplicity of installation and ease of servicing are other great cost saving factors. For the first time a permanently sealed system can be delivered to the cabinet manufacturer. By using a four-valve multiple of this manifold the hermetic unit and the cabinet may be placed in operation by simply connecting the two halves and opening the valves.

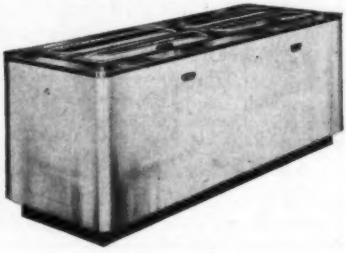
Information and literature on this two-valve refrigeration manifold will be forwarded on request by The Weatherhead Company, Cleveland 8, Ohio.

Merchandizer

NEW models of the Biltwel Merchandizer, Frazer & Johnston's display-storage frozen food cabinet, are now rolling off the assembly line, according to a recent release. These models are sectionally designed so that a frozen food department can expand as sales increase, simply by adding to the original Biltwel equipment.

According to the manufacturer, these newly designed cabinets keep frozen foods constantly on display. The Merchandizer is equipped with transparent plastic, finger-tip lifting lids which give easy access and full display to frozen foods. The manufacturer claims that the lightweight lids may be completely lifted off for 3 to 4 hours during rush periods—a feature that has been proved to increase frozen food sales.

Merchandizers are available in single and double width. Basic unit is two end sections, to which may be added as many center sections as desired. Each compartment holds 350 or more standard 12-ounce packages. Center compressor housings are available for standard models.



News of the Equipment Industry

BRANSON IS SALES MANAGER WITH WESTERN REFRIGERATION

T. F. RHOY and Chalmer Tefft, co-partners of Western Refrigeration Company of Oakland, announce the recent appointment of Lem V. Branson as their sales manager. This company is a wholesale distributor in Northern California of products of many well known manufacturers such as Iceberg Locker Systems, Victor Products Corp., Jordon Refrigerator Co., Revco, Inc., Paley Manufacturing Corp., Merchant & Evans Co., and others.

LEM V. BRANSON

Mr. Branson is well known to the refrigeration trade, especially in the west, with 14 years experience in the wholesale field to his record. He was formerly a stockholder and officer of California Refrigerator Company of San Francisco and Oakland. During the past year he was active in REWA, serving as chairman of the Trade Relations Committee. He also served as first chairman of Western REWA, comprising Region 9, but resigned from both of these offices at the time of his resignation from California Refrigerator Company.

Sales Policy

Mr. Branson feels that Mr. Rhoy and Mr. Tefft, from their many years of experience in the refrigeration contracting business, have developed some excellent ideas and fundamentally sound policies in the organization of Western Refrigeration Company. Unlike most distributors of commercial refrigeration equipment, this company does no retail business. Their sales are to dealers or wholesale industrial users and in no case do they make any installations. This eliminates any possibility of being in competition with their dealers. A few of the products are distributed through franchised outlets, but most items are sold to any legitimate sales dealer or contractor. Sales are handled through a resident salesman in each specified territory, who is responsible for all possible contacts in his area, thus giving the company complete controlled coverage of their entire territory and assuring the manufacturer of thorough distribution.

The soundness of this policy is being proven by the rapid growth of the company and a steady increase in sales being developed in all lines they represent.

* * *

MARSH TAKES FIRM PRICE STAND

THE Jas. P. Marsh Corporation of Chicago is one organization willing to take a firm stand against the inflationary trend of industrial pricing. In plain terms of guaranteed prices the Marsh management has declared a "firm price policy" in the sale of Marsh products such as pressure gauges, dial thermometers, packless valves, traps, vents and related steam heating specialties. Any prices of Marsh products quoted henceforth during 1947 will not be subject to any increase above the prices in effect on the date the order is placed, according to the announcement.

Commenting on the program, the heads of the Marsh organization stated that it was a difficult decision to make in view of the risks involved. "We have come to the conclusion, however," said Barrett Scudder, president, "that it is about time for buyers to be told what they are going to pay for the products they buy. Our idea is to give our customers a taste of pre-war price stability. It seems to us that the hazards involved in establishing firm prices must be assumed by the nation's manufacturers if the spiralling of prices is to be checked and the pitfalls of inflation are to be avoided. In so far as possible we are asking our suppliers to cooperate in the firm price program to protect our position. If we can contribute even in small measure to the return of sound business practice and forthright competition, the risk we have assumed will have been well rewarded."

PETERSON REPRESENTS FEDDERS

APPOINTMENT of C. R. Peterson, 18 Whitridge St., Dorchester, Mass., as New England Representative handling Fedders unit coolers and other refrigeration products, is announced by E. A. Bonneville, Sales Manager of the Refrigeration Division of the Fedders-Quigan Corporation, Buffalo, N. Y. Mr. Peterson is a New Englander by birth and long residence, and has a wide acquaintance throughout the six states comprising his territory.

CUBAN WHOLESALER

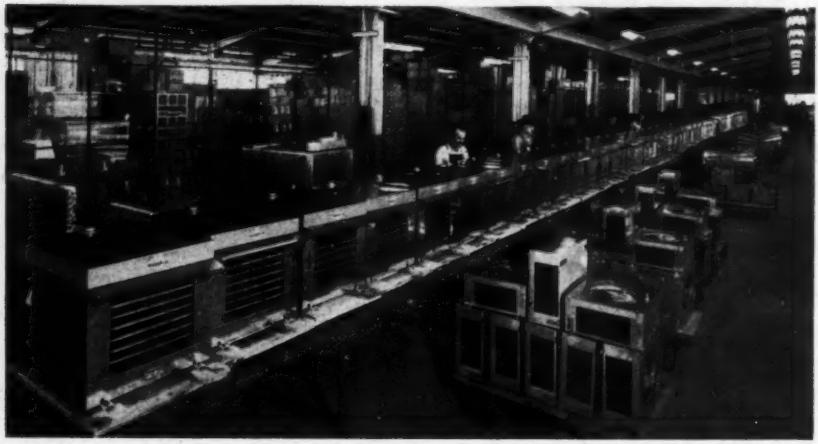
AN INCREASING number of representatives of American firms have visited neighboring wholesalers operating in southern countries. These visits have prompted favorable comments regarding business operations of these wholesalers and the well stocked supplies comparable to those seen in the States. Recently Mr. E. J. Zoll, President of the Chicago-Wilcox Mfg. Co., Chicago, paid a visit to Habana, Cuba, and spent some time with Messrs. Alvarez and Lopez, who operate Servicio General De Refrigeracion of Habana. Mr. Zoll in commenting on their operation observed "I was most impressed with their physical and personnel setup. They have a wonderful building and though they are doing considerable remodeling, their present accommodations are a credit to the industry. It was most gratifying to see the systematic method of displaying American refrigeration products."

PRODUCTION INCREASE REPORTED BY REFRIGERATION ENGINEERING

AS REFRIGERATION Engineering, Inc., in Los Angeles moved into peacetime production early last year, they found an ever increasing demand for the many types of refrigeration evaporators which their company produces. To provide additional manufacturing facilities and to make room for continued growth and expansion, the company constructed a three acre factory, centered on a thirteen and one-half acre tract.

Almost from the first week of occupancy, "Recold" production started to step up, but the sharp increase in manufacturing did not become noticeable until the first of this year. At this point, production flow sheets showed a sharp curve upward and a recent check indicates that over-all production has been stepped up a little more than thirty-five per cent over last year's output.

"Recold" as the firm is familiarly known in the refrigeration industry, are the de-



A production increase of approximately 35 percent has already been recorded by Refrigeration Engineering, Inc., Los Angeles, California, since they moved into their new plant late last fall. Production lines like the one illustrated here, are rapidly bringing thousands of refrigeration evaporators to completion to meet the steadily increasing demand for "Recold" products. Although production schedules are not yet in full swing it is estimated by Hy Jarvis, Vice-President and General Manager, that delivery schedules will increase sharply within the next few months.

velopers of the water defrost method of refrigeration. This product is fully covered by U. S. and foreign patents. Today in addition to "Recold" there are eight other manufacturers in the United States who are now producing water defrost coils under license agreements with "Recold."

The company manufactures more than fifteen different styles of blower coils in approximately 136 different models. Indicative of the new fields in the refrigeration industry which the company plans to enter is a one hundred ton evaporative condensor which was recently completed.

NAVY AWARD WINNER MADE CHIEF ENGINEER OF SUPERIOR

APPOINTMENT of Robert T. Moore as Chief Engineer of Superior Valve & Fittings Co. has been announced by J. S. Forbes, President.

R. T. MOORE

Mr. Moore, formerly with the Heat Transfer & Industrial Gases Section of the Bureau of Ships, U.S. Navy, as Senior Mechanical Engineer and Industrial Gas Specialist was one of the very few to win the Navy's highest civilian award "for distinguished service to the United States Navy in the field of Industrial Gases. He organized the development of tanks for the transportation by air of liquid oxygen and also established the self-contained carbon dioxide generating units which permitted the filling of high pressure vessels at advanced bases to be used in cambating fires on fighting ships—and development of shipboard oxygen generating plants—assisted in the establishment of a Naval Training School for the study of compressed gases—many outstanding achievements in the highly important field of industrial gases."

Following his schooling at the University of Virginia and before joining the Navy in Washington as Technical Assistant to Captain T. J. Bay, Mr. Moore acquired a varied practical and business experience at Portsmouth and Norfolk, Virginia, and while a resident there, graduated from the Navy Trade and Technical School.

His work at Superior will include full responsibility for all research, development and quality control of all Superior Valve & Fittings Co. products, according to Mr. Forbes.

"I am looking forward to Mr. Moore being of very great assistance to me on several technical committees," says Mr. Forbes. "His pre-war and Navy experience should qualify him well to engineer our products for this industry."

YATES TO REPRESENT PEERLESS

IT WAS announced recently by Mel W. Knight, General Sales Manager of Peerless of America, Inc., Chicago, that Olin C. Yates, of Northwest Factors, 1607 33rd Avenue, Seattle, Washington, has been appointed as their new manufacturer's agent in the territory covering the states of Washington, Wyoming, Oregon, Montana and Idaho.

OLIN C. YATES

Mr. Yates is a director in the Refrigeration Service Engineer's Society and has considerable background in the refrigeration industry . . . having started his career as a service engineer. This has been a valuable asset as it has given him an understanding of field problems and enables him to talk the language of the trade.

From this status, Mr. Yates went on in the field as Sales Engineer and Assistant Manager of a well-known refrigeration supply house and rapidly advanced to higher positions in other firms in the industry—spending twelve years in the northwest territory.

He has worked as a service engineer, with a jobber, and with a manufacturer's representative and represents several nationally known manufacturers at the present time.

COULTER TO LEHIGH SALES

J. C. MILLER, General Manager of Lehigh Manufacturing Company, manufacturers of Lehigh Blu-Cold Compressors, announces the appointment of Clayton C. Coulter of Detroit, Michigan, as Sales Man-

ager for the organization. The announcement came during the three-day sales conclave held at the Lancaster, Pa., and Easton, Pa., plant of the Lehigh Company. Previously the sales head work had been done by Miller.

Coulter, who has been representing Lehigh in Michigan for the past year, was executive officer of the Detroit Ordnance District for the United States Army during the war.

Coulter will officially take over his post at the main office in the Lancaster plant of the company on April 1, where he will also make his residence.

The three-day sales meeting was attended by all the sales representatives, as well as Miller, President Frank E. Shumann; Treasurer Alvin A. Shumann.

G. E. CREATES NEW REPAIR DIVISION

CREATION of a Renewal Parts Division and the appointment of L. E. Thompson as manager of the division has been announced by G. R. Prout, vice president and general manager of General Electric's Air Conditioning Department.

The new division is responsible for all operations involving parts and components of the department's products, including procurement, warehousing, marketing, and shipping. All "repair and return" material and equipment will also be handled by the new division.

Organization Changes

Reorganization of certain sales and product divisions to facilitate expansion of General Electric's air conditioning department has been announced by G. R. Prout, vice president and general manager.

The Refrigeration Machine and Remote Equipment Divisions have been established to assume full product line responsibility for the design, manufacture, and marketing of refrigeration machines, remote air conditioners, evaporative coolers and condensers, heat transfer surfaces and coils, self-contained air conditioners (except room coolers), remote room air conditioners, and product coolers. W. F. R. Karsten has been appointed sales manager of these divisions.

R. U. Berry, formerly manager of the Field Engineering Division, has been named manager of the Industrial, Marine, and Contractor Division, with responsibility for sales of all department products to industrial, marine, and contractor customers and to agencies of the United States.

The field engineering division and the commercial engineering division of the Air Conditioning Department of General Electric have been combined under the title, Commercial Engineering Divisions.

F. H. Faust, formerly head of commercial engineering, has been named manager of the new divisions.

HUGHES JOINS LARSON CO.

JAMES A. HUGHES has recently been appointed branch manager of the Rockford branch of the Gustave A. Larson Co. Mr. Hughes was with the Anti-Aircraft Division of the Civil Service Commission during the war. He is now making plans for expanding the facilities of the Gustave A. Larson branch to offer a wider selection of stock and better service to the trade.

NEW CATALOGS AND BULLETINS

SOUTH BEND LATHE CATALOG NO. 13-F, just off the press, illustrates in full color and completely describes the 13-inch swing South Bend quick change gear and toolroom lathes. Attachments and accessories are also shown.

The 13-inch South Bend Lathe features a quick change gear box which makes immediately available gear combinations for cutting 48 pitches of screw threads, right- or left-hand, and 48 power longitudinal feeds and cross-feeds. The various gear box lever settings are easily selected from an attached direct reading index chart. Also featured on the 13-inch lathe is a double wall apron which is equipped with a friction clutch to operate the power longitudinal feeds and cross-feeds. The lathe headstock is back-geared and is equipped with a superfinished spindle, adjustable precision bearings, and an efficient oiling system The fully enclosed motor drive provides eight headstock spindle speeds ranging from 34 to 875 r.p.m.

A copy of Catalog No. 13-F may be obtained by writing to the South Bend Lathe Works, 207 E. Madison St., South Bend 22, Indiana.

SERVICE PARTS CO., 2511 Lake St., Melrose Park, Ill., have released their new 178 page Catalog No. 47. This catalog has many new items, consisting of refrigeration, air conditioning and heating parts, supplies, and shop equipment, as well as two full pages of engineering data. Write for your copy on your letterhead.

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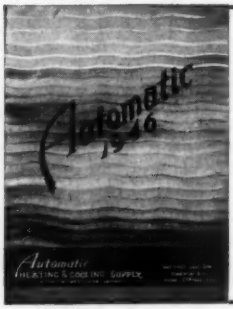

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Rate: $2.50 for fifty words or less, 40 cents for each additional ten words or less.

FOR SALE—AC motors ½ to 3 h.p., single and 3 phase, list price. Immediate delivery. EDISON COOLING CORP., 310 E. 149th St., Bronx 51, New York, N. Y.

WANTED—Grunow units and compressors, any and all you have regardless of condition. Address Box AP-7, THE REFRIGERATION SERVICE ENGINEER, 433 N. Waller Ave., Chicago 44, Ill.

FOR SALE— Ice cream freezers and cabinets, new and used. Refrigeration machines up to 3 h.p., available for immediate delivery. Address Box AP-2, THE REFRIGERATION SERVICE ENGINEER, 433 N. Waller Ave., Chicago 44, Ill.

SITUATION WANTED—Veteran having completed refrigerating course, domestic and commercial, desires position in New York City. Ambitious and capable worker. Salary secondary. Married. Reply 700 East 156th St., New York City. Tel. Mott Haven 9-4722. George Casper.

WANTED — EXPERIENCED REFRIGERATION COUNTER MAN. Good opportunity for advancement. Apply in own handwriting, stating jobbing and any other experience, education, and starting salary required. Applications will be treated strictly confidential. J. M. Oberc, Inc., 904 W. Baltimore, Detroit 2, Mich.

POSITION WANTED—Refrigeration and air conditioning. Installation and Service. Experienced on commercial and domestic units. A graduate of accredited refrigeration and air conditioning school. 37 years of age, married and have one child. Address Box AP-9, The Refrigeration Service Engineer, 433 N. Waller Ave., Chicago 44, Illinois.

FOR SALE OR PARTNERSHIP—Long established Refrigeration Service Business, in Chicago on main street. Wonderful opportunity for ambitious man; large clientele. Daylight shop. Best equipment and parts. Reasonable rent. Owner has too much other work at present and cannot handle it. Address Box AP-5, THE REFRIGERATION SERVICE ENGINEER, 433 N. Waller Ave., Chicago 44, Ill.

POSITION WANTED—Well qualified Refrigeration Service Engineer with 8 years' actual field experience in air conditioning and commercial refrigeration desires permanent position with West Coast firm in supervising capacity in shop or field. Have new car—good tools. Age 34. Address Box AP-6, THE REFRIGERATION SERVICE ENGINEER, 433 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Sealed Unit Compressors Remanufactured. We offer you guaranteed service on exchange compressors. All makes $36.00 and up F.O.B., Detroit. One year guarantee on mechanical parts and workmanship. We will buy your old Sealed Unit compressors, postage paid $5.00 each. Write us for shipping instructions. Penquin Products Co., 21555 Grand River Ave., Detroit 19, Mich. Garfield 7332.

WANTED—Large Refrigeration Organization has opening for service men. Must have at least 6 years actual field experience and be able to handle air-conditioning and commercial service. Must have own car, full set of tools. $1.95 per hour and time and one half for overtime. Can be kept busy year around with excellent earning. Address Box JA-6, The Refrigeration Service Engineer, 433 N. Waller Ave., Chicago 44, Ill.

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